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COMPUTERWORLD

CHRIS COXWELL

MAINFRAMERS IN *transition*

Former mainframers like GTE's Jake Wilson are ditching old skills and moving into the scary world of Unix, C and objects. They say the change has been frustrating but rewarding. For their stories,
SEE IN DEPTH, PAGE 103.

GM seeks consistency

Goal is to standardize desktops, tools across enterprise

By Ellis Booker

General Motors Corp. has quietly pushed the pedal to the metal, embarking on the fastest and largest IS infrastructure upgrade in its history.

The goal is to change the way GM handles information on the desktop, in the workgroup and across the enterprise. This, in turn, "lays the foundation for the implementation of a common business communication strategy across General Motors," said Donald G. Hedeen, director of desktops and deployment at GM and manager of the upgrade program.

Donald G. Hedeen, *COE program manager, wants to bring simplicity, commonality to GM offices*

He refers to the project as the "deproliferation" of GM's office technologies.

The Detroit automaker's three-year plan, known internally as the Consistent Office Environment, or COE, calls for replacing a hodgepodge of desktop models, network operating systems and application development tools with a shorter and hence more manageable list of vendors and technology platforms.

"Eight years ago, GM moved to make specific business units profit centers," said Henry Osti, who spent several years at GM and is now a consultant at CSC Index, Inc. in Cambridge, Mass. The result of this structure, Osti added, was "tremendous duplication of capacity" — a situation that current GM Chief Executive Officer and President Jack Smith Jr. is working to redress.

GM subsidiary Electronic Data Systems Corp. is coordinating the project for GM North American Operations.

COE is a landmark, too, for the few lucky vendors tapped by GM/EDS to supply hardware and software components. For example, Lotus
GM, *page 12*

Internetworking advance speeds data transfer rates

By Stephen P. Klett Jr.

Symplex Communications Corp. last week unveiled an internetworking technology that applies LAN switching concepts to the wide area in order to deliver faster transmission speeds and lower costs than traditional dedicated and dial-up access services.

Called Direct Route, the technology is "connection-oriented" and combines Asynchronous Transfer Mode-like scalable bandwidth with switched digital telecommunications services such as Integrated Services Digital Network.

Connection-oriented means Direct Route makes point-to-point connections without an intermediate device such as a hub or bridge. Traditional "connectionless" methods such as leased-line routers require an intermediate device to store and then forward data.

Significantly faster

Speed is the primary benefit of cutting out the middleman. For example, transporting a 3M-byte graphics file could take seven minutes using a leased-line router at 56K bit/sec. and twice that time using dial-up connections. With Direct Route, that file could be transmitted in 26 seconds, according to Symplex in Ann Arbor, Mich.

The Direct Route system, slated to ship by the end of the second quarter, consists of an access device similar to a router that provides up to four dual-channel ISDN connections for a total bandwidth
Data transfer, *page 10*

Defense firm merger may roil IS waters

By Joseph Maglitta

Ongoing industry shake-ups may lead to new horizons for aerospace and defense firms, but they signal rough flying for information systems professionals facing layoffs and sticky integration issues.

As Martin Marietta Corp. and Northrop Corp. battled last week for the right to buy Grumman Corp., top IS officials at all three companies were predictably tight-lipped. But industry analysts said work force reductions were a certainty.

"We're keeping at arm's length for the next 30 days," said J. Thomas Kelly, Grumman's director of information management business planning. "This should be interesting," he added.

Analysts said last week's announcement of the proposed $1.9 billion merger of Martin Marietta and Grumman would create the nation's largest aerospace/electronics concern. But Northrop muddied the waters with its own $2 billion bid to buy Grumman.

Grumman Corp. ranked fifth in the aerospace industry in Computerworld's Premier 100 ranking of the most effective users of IS.

As the battle rages, Kelly said Grumman's IS department is pursuing business as usual. "We're still in the process of centralizing our financial systems and moving them to client/server," he said.

While a Securities and Exchange Commission investigation into stock trading surrounding the merger made the companies more circumspect than usual, Grumman officials at the Bethpage, N.Y., headquarters privately conceded that a sizable work force reduction would be necessary.

In another corner of the defense
Defense, *page 12*

NCR sites wary of AT&T strategy

By Thomas Hoffman

Analysts once described it as the smoothest merger in corporate history. But in the three years since AT&T acquired NCR Corp., the results have been anything but stellar.

Despite the Dayton, Ohio, computer maker's efforts to focus, users have mixed feelings about its performance to date and its apparent strategic direction. In general, users said they are satisfied with the products and have continued to receive strong service and support despite recent downsizing efforts at NCR, which was recently renamed AT&T Global Information Solutions.

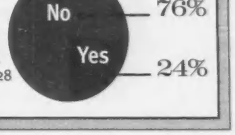
But users also voiced some skepticism about how the company's restructuring efforts will eventually affect support. For example, the former NCR late last year created more than 500 customer-focused teams of sales and product specialists to work with its largest customers (see chart).

No impact

NCR/AT&T's new service initiatives

HAS NCR'S SERVICE AND SUPPORT IMPROVED SINCE THE VENDOR ESTABLISHED "CUSTOMER-FOCUSED TEAMS" IN 1993?

Based on 75 NCR sites surveyed by First Market Research Corp. between Feb. 28 and March 10.



Those changes have drawn the ire of at least one AT&T Global Information Solutions user: State Industries, Inc., an Ashland City, Tenn., water heater manufacturer that uses four NCR 3400 manufacturing systems. "The impact of
NCR, *page 8*

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MEET THE NEW BOSS

BRIAN SMALE

While the technical headaches have never been tougher, more and more non-techies are seizing the IS throne. A new Computerworld survey reveals that "outsiders" from general business backgrounds now hold almost half of the top technology posts at large U.S. businesses, and many say their ranks will continue to swell.

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NEWS

■ Vendors will go public with **object battles** fought on the sidelines during the past few years. *Page 4*

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COMMENTARY

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Correction

The article "Manage my inventory or else" [CW, Jan. 31] incorrectly stated that the Inforem III inventory replenishment program was developed by Procter & Gamble Co. It was developed by IBM.

Executive Briefing

General Motors races ahead with the biggest IS infrastructure upgrade in its history, a three-year plan known internally as the Consistent Office Environment, or COE. GM will replace a jumble of desktop models, network operating systems and application development tools around a short list of vendors and technology platforms. *Page 1*

If you want to learn — and change — the transition from a mainframe environment to the new world of Unix, distributed systems and objects can be rewarding, although nobody said it would be easy for the IS professional. Three mainframers talk about the transition to smaller systems. *Page 103*

The changing map of the aerospace industry shows trouble ahead for IS professionals as layoffs and systems integration issues are expected from the merger of Martin Marietta and Grumman and cutbacks at Raytheon. *Page 1*

Pen-based computers are the golden spike for Conrail, which is tying wireless devices into its host systems and helping train crews stay in touch even while they're rolling down the rails. *Page 55*

X/Open is undergoing a transition as it strives to boost membership and push annual revenue past its current $17 million to meet the increasing demands of setting open systems standards for distributed computing. Users are gaining influence as they set priorities for open systems specifications as part of a year-old requirements process. *Page 16*

The risks of going with an early version of Novell's NetWare 4.x were well worth it for National Semiconductor, which has placed important data and applications within reach of marketing, sales and support field personnel. *Page 57*

With vendors such as IBM and EMC knocking heads with competing RAID offerings in the host-based storage sector, users can expect lower prices. *Page 67*. Meanwhile, experts see new reasons for users to explore RAID options. *Pages 91-99*

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	PHONE:	FAX:
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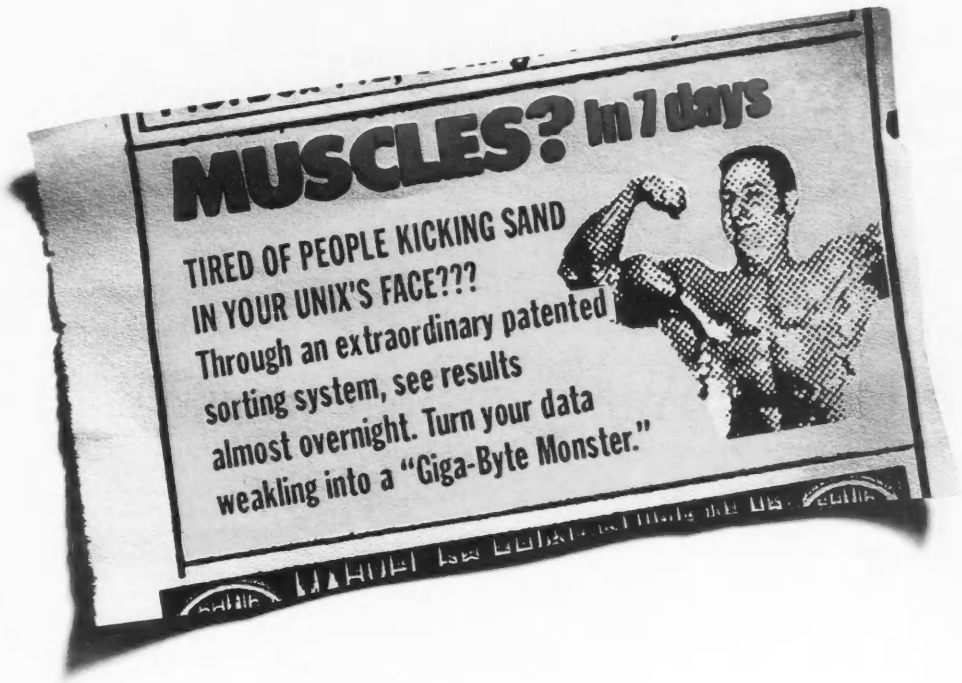

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IBM tool kit provides link to OLE

By Melinda-Carol Ballou

IBM will one-up Microsoft Corp. and Digital Equipment Corp. in the object standards battle this week by unveiling a tool kit that will enable developers to create applications that support IBM's object model and access data in applications that support Microsoft's Object Linking and Embedding (OLE) object model, industry sources said.

IBM's SOMobjects for Windows will be announced at Software Development '94 as expected. Already shipping on OS/2 and AIX, this new version of the System Object Model/Distributed System Object Model (SOM/DSOM) tool kit will enable Windows application developers to take advantage of IBM's object model.

More importantly, SOMobjects for Windows will incorporate the ability for OLE applications to use SOMobjects and interoperate with them, sources said. IBM accomplishes this using a Component Object Model (COM) "emitter," the company said.

COM is Microsoft's object model for OLE. The COM emitter, created internally at IBM, allows applications written with the COM interface to access SOMobjects and vice versa, sources said. "It will work the same way language bindings work to let different languages use SOMobjects," one source said.

Microsoft said it will leave the job of linking OLE to the Common Object Request Broker Architecture (CORBA) primarily to other vendors such as Digital. Microsoft said it is in a position to do this because OLE is ubiquitous in the marketplace, with around 130 independent software vendors committed to offering products that support it. IBM's SOM and DSOM, for instance, has about 20 committed independent software vendors.

State of confusion

IBM's support for OLE is significant because there has been a rift in the industry over setting a standard for how objects will communicate with one another across the enterprise. As a result, a number of corporate developers have put off fully deploying object-based applications while they wait for the dust to settle. Developers want access to all of the relevant models, hence IBM's leg up on Microsoft and Digital with its Windows SOMobject tools, industry analysts said.

"Taking an OLE object and being able to run it under SOM . . . is very important to us because we get acceptance on other platforms for our applications — AIX and OS/2, for instance — where right now we're only Microsoft- or Windows-specific," said Larry Harris, technical manager at Quick America Corp., a New York market data provider.

In both IBM's and users' favor is the pricing for SOMobjects for Windows, which analysts said is reasonable. It mirrors the pricing for SOMobjects for OS/2: $75 for single workstations, $235 for a single workgroup. Tiered contract licenses for $30,000 give an unlimited right to distribute DSOM across multiple operating systems and platforms, and $10,000 allows users to replicate DSOM within a single platform, sources said.

Digital and Microsoft, meanwhile, are expected to ship early release specifications for their technology linking OLE to Digital's CORBA-compliant Object Broker later this month. Digital officials said they are "on track" and that they believe their approach is the correct one. Products incorporating the specification are not expected until late this year, at the earliest.

Microsoft, meanwhile, is expected to announce new tools at the show that will ease the pain of OLE development. These will include the ability to create OLE server objects using Visual Basic development tools, OCX (OLE Controls) custom controls for OLE [CW, Jan. 24] and Line of Business Objects (known as LOBjects), sources said. The latter will offer customized objects for developers targeting specific vertical businesses, according to third-party sources.

In addition, Microsoft will announce a series of products for the company's Visual C++ family of development tools, according to company sources.

HyperDesk backs off CORBA. See page 30.

NetView/6000 to manage SNA

Peregrine and IBM products to compete

By Elisabeth Horwitt

Peregrine Systems, Inc. last week began shipping a product that enables IBM's NetView/6000 platform to manage IBM SNA networks. The move was timely, considering that IBM expects to ship its own SNA Services for the SNMP platform in a couple of months.

While NetView remains the primary platform for managing SNA, products such as Peregrine's OpenSNA and Cabletron Systems, Inc.'s BlueVision tap into "a growing customer demand for downsizing SNA management" to Simple Network Management Protocol (SNMP)-based network management platforms, said Ginny Mellinger, an analyst at International Data Corp. in Framingham, Mass. Those platforms include NetView/6000, Cabletron's Spectrum and Hewlett-Packard Co.'s OpenView.

Troubleshooting power

Charles Schwab & Co., for example, intends to use Peregrine's existing OpenSNA for OpenView to manage SNA in conjunction with a corporatewide TCP/IP internetwork now being rolled out, said Bob Lee, senior manager of networking at the San Francisco brokerage. While NetView will continue to handle the bulk of SNA management, OpenSNA will let OpenView users troubleshoot networks that support both SNA and TCP/IP protocols, Lee said.

Another plus, according to users, is that graphically oriented SNMP management workstations offer enhanced graphic capabilities and easier-to-grasp presentations of SNA data than existing NetView user interfaces — even IBM's Graphical Monitor Facility.

Those features will enable Schwab to provide OpenSNA for OpenView to less technical users at a recently opened data center in Phoenix. And 3M Co. plans to implement OpenSNA to provide help desk managers using OpenView with high-level information about SNA installations, "before they get phone calls [about problems] from users," said Wayne Bowker, an advanced analyst at the St. Paul, Minn.-based manufacturer.

However, Peregrine's SNA management on NetView/6000 will soon confront IBM's own SNA Manager/6000. The latter's product will be fully integrated with NetView/6000 applications and a graphical user interface, "so you can see SNA, TCP/IP and Novell, Inc. IPX traffic on the same map in the same window," said IBM product manager Bruce Hillsberg. Peregrine claims to do the same.

One difference between the two products: NetView/6000 collects its SNA alerts and statistics from NetView, while OpenSNA collects its data directly from VTAM and other SNA utilities. As a result, OpenSNA users could, if they liked, dispense with NetView. The integration with the host-based network management system allows users to configure NetView to automatically respond to alerts that are reported by NetView/6000, Hillsberg said.

Cabletron is preparing to restructure BlueVision so that it, too, can function either with or without NetView, a spokeswoman for the Rochester, N.H., firm said. BlueVision will also work with Sterling Software, Inc.'s NetMaster. The company also plans by year's end to enhance the platform to manage IBM Advanced Peer-to-Peer Networking installations. Cabletron also plans to integrate BlueVision SNA management applications with other mainframe applications.

OpenSNA for NetView/6000 is priced starting at $27,750.

Peregrine also announced Session Recap, an OpenSNA application for capturing and analyzing 3270 session information. The data is stored on the IBM mainframe, so administrators can play back the user's call, a Peregrine spokesman said. Session Recap also presents data "in plain English" rather than in bits and bytes, said Bowker, who beta-tested the product.

Available now, Session Recap is priced at $24,000.

NetWare 4.1 delivery stalled

By Elisabeth Horwitt

■ Novell, Inc.'s shipment schedule for its crucial NetWare 4.1 release has slipped again, this time to the fourth quarter, the company announced last week.

The upcoming version, originally slated for a midyear shipment and then shifted to late summer [CW, March 7], is expected to deliver a slew of new features and functions that many users consider critical to a commercial implementation of Novell's enterprise network service platform.

Last week's decision is the result of feedback from NetWare 4.1 alpha sites and NetWare 4.01 customers who asked for enhancements beyond what Novell had planned for the next version, Novell spokesman Bob Young said.

Among the features users requested were the following:

▶ Directory enhancements, such as the ability to distribute NetWare Directory Services (NDS) upgrades across multiple servers using Novell's software distribution facilities.

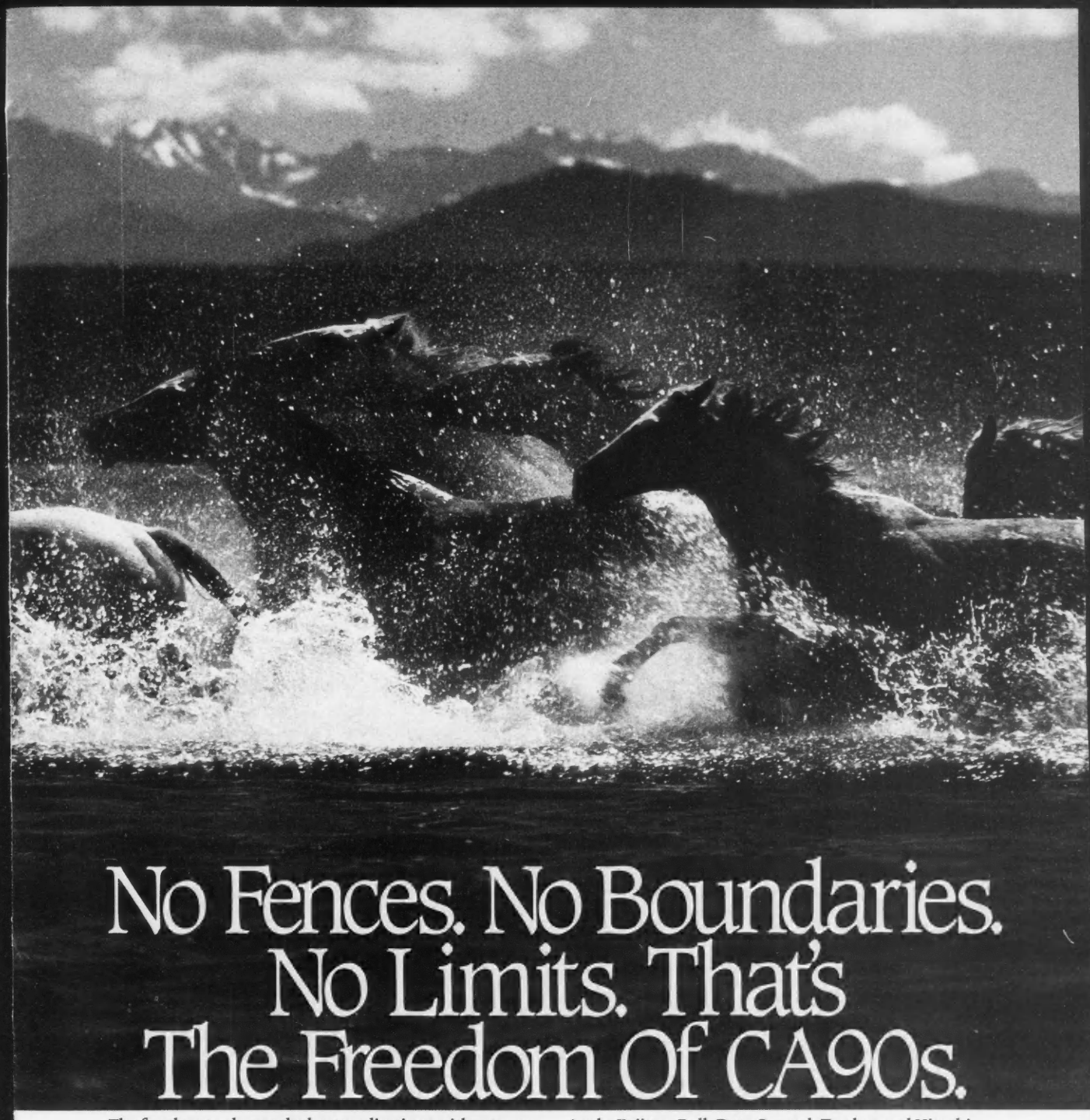
▶ Stronger integration of NetWare 4.x and NDS with services such as NetWare for SAA, NetWare/IP and NetWare NFS.

This would enable such services to take advantage of the NDS directory. For example, it would allow NetWare clients to transparently access a mixed environment of IBM hosts and NetWare servers.

The bad news for already impatient users is that they will now have to wait until the fourth quarter for key functions such as NetSync, which provides full NDS support for NetWare 3.x, and tools for merging and pruning NDS trees. Novell had until recently hoped to announce those tools ahead of NetWare 4.1, Young said.

Novell is still trying to decide whether it can deliver an NDS implementation for its Global Message Handling Service ahead of NetWare 4.1, Young said. This capability was originally slated for a spring release.

Novell will deliver a NetWare 4.01 refresh this summer that will fix some outstanding bugs and incorporate all the release's current patches, Young said. One such patch eliminates the problem of NDS directories occasionally freezing up so administrators can no longer change them.



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OpenDoc: A path to interoperability

The day is coming when software systems at most user sites will be assembled from discrete modules or components. If the Component Integration Laboratories can deliver on its plans for OpenDoc this year, that day will be closer than many people believe, and software will more closely resemble hardware that is assembled from off-the-shelf parts.

OpenDoc was conceived as a compound document architecture that could tie together diverse types of data in a document that was shareable on a network. Apple, IBM, WordPerfect and other parties were working from their own vantage points on pieces of what turned out to be a common problem. They decided to coordinate efforts through the Component Integration Laboratories.

The latter might be described as a paper organization rather than anything concrete. There is no laboratory or staff at Component Integration. The technical work has been divided among Apple, IBM and WordPerfect, with each party working on pieces that are crucial to its own product line. But they have agreed to use sets of common interfaces, a common means for objects to exchange messages, a common storage system that can keep compound documents intact, etc.

OpenDoc provides a superstructure that allows today's applications to be integrated into componentized systems of the future.

Charles Babcock

"We started thinking about distributed objects because we felt that was how people would downsize," said Cliff Reeves, director of object technology products at IBM.

Users may never see the benefits of client/server computing if they do not have the means to distribute objects over a network or share them across platforms, which OpenDoc promises to do with the Macintosh, Windows, OS/2 and Unix.

To get commercial developers started, software development kits will become available in beta form for each platform this summer, with final versions available in the fall. Each kit will not be precisely the same but rather will reflect the state of the art for each platform. Nor can it be assumed that cross-platform interoperability will be implementable in the early stages.

Nevertheless, OpenDoc provides a superstructure for these efforts. It opens the way for applications, such as WordPerfect's word processor and Borland's Quattro Pro, to be integrated into more componentized systems in the future as their makers begin to implement OpenDoc interfaces and features into applications.

OpenDoc's five main components are the following:

- The System Object Model, a language-neutral mechanism for object messaging that was designed by IBM and adopted as a standard by the Object Management Group.
- The Apple-originated Bento object storage facility, which is similar to an object-oriented database facility that can store and retrieve objects or compound documents as a single file.
- The Open Scripting Architecture, which is modeled on AppleScript and is a cross-platform scripting language of 14 basic verbs and nouns, usable for widely divergent applications.
- OpenDoc's set of common APIs, which provide for interactions among operating systems and across hardware platforms.
- OLE 2.0 interoperability for OpenDoc under Windows, which is being supplied by WordPerfect.

An OpenDoc-compliant application can serve as a container for an OLE object. OpenDoc will supply the translation for a call to an OLE object, and for that matter, OpenDoc objects embedded in OLE applications can respond to an OLE message calling them.

The latter could be a decisive feature in the eventual acceptance of OpenDoc. Software developers who adopt the OpenDoc architecture will have use of an architecture that gives them the equivalent of Microsoft's OLE 2.0 facilities as well as more generalized, larger system capabilities.

Babcock is *Computerworld*'s technical editor. His MCI Mail address is 575-2737.

Oracle targets workgroups

By Kim S. Nash

Oracle Corp. plans to disclose tomorrow a workgroup-level version of its Oracle 7 database that was designed for up to 50 users and will be sold through resellers, company sources said.

Called Workgroup Server, the product will run on IBM's OS/2 and Microsoft Corp.'s Windows NT. The developer's version ships this month.

This is the second in a series of offerings aimed at Microsoft's SQL Server. Oracle previously shipped a similar-level database, dubbed OracleWare, for Novell, Inc.'s NetWare.

While OracleWare supports 5-, 10- and 20-user setups, the workgroup edition of Oracle will cater to the next highest user tier, said Nimish Mehta, vice president of desktop products.

Oracle has grown fat selling relational databases primarily to Unix shops but must now look to other areas for continued growth, said Rich Finkelstein, an analyst at Performance Computing in Chicago.

Several users welcomed the idea of easier to manage, more tailored Oracle products. "I see more departmental client/server systems going up than big enterprisewide projects," said Jeffrey B. Firestone, director at the South Central Oracle Users Group.

Workgroup Server will contain the basic functionality of an enterprise-level product but will not offer specialized, high-volume features such as replication or on-line backup, another Oracle insider said. Installation procedures will also be slimmed down.

Microsoft's aggressive pricing for SQL Server for Windows NT has forced Oracle's hand, Finkelstein said. For example, a 50-user, Unix-based Oracle 7 database costs about $42,000, according to Oracle; an unlimited-user edition of Microsoft SQL Server for NT, meanwhile, is priced at $15,000.

Price is a concern

"If there's one thing that hurts Oracle, it's the big bucks people have to spend on the product," said Edward Elloian, chief executive officer of A&I Technologies, Inc., an integrator and reseller in Pittsburgh.

Pricing for the workgroup version of Oracle would narrow the price gap between it and Microsoft's SQL Server. "We will price accordingly," Mehta said. He declined to cite numbers.

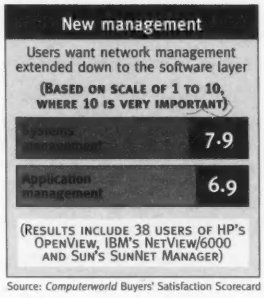
And because Microsoft has made an art form of selling through indirect channels, Oracle is recruiting similar outlets. Oracle claims to have signed up more than 250 NetWare resellers to peddle OracleWare. Those firms will likely sell Workgroup Server as well.

Application manager in works

By Elisabeth Horwitt

Legent Corp. and IBM last week announced plans to produce an industry standard for collecting alerts and statistics from client/server applications so SNMP platforms can collect and analyze the data. However, the duo will compete with several other would-be standards setters in their efforts to get key developers to adopt their agent, according to user and analyst sources.

Code-named Mercury, the project plans to produce by the fourth quarter a software development kit that will enable developers to create agents that sit on each system and collect key statistics about their applications. An Agent Management System will provide a means of distributing and updating new and existing agents that are distributed around a network.



Source: *Computerworld* Buyers' Satisfaction Scorecard

Intelligent agents such as the one proposed by IBM and Legent are "a really important missing piece" of client/server management, said Jeremy Frank, an analyst at research firm Gartner Group, Inc. in Stamford, Conn.

Platforms such as Hewlett-Packard Co.'s OpenView and Novell, Inc.'s NetWare Management System can monitor performance and errors on Unix and NetWare servers.

However, no standards exist for allowing such platforms to get down to the application level to discover, for example, whether a relational database management system has corrupted files.

Several users said they want to see such a standard, but they questioned vendors' ability and willingness to deliver.

Martin Marietta Corp. (see story page 1) is aggressively seeking such tools, according to Frank Belland, a senior communications consultant at the company's Orlando, Fla., location. "If an application under Windows or Unix or a mainframe aborts," the system should be able to notify the Simple Network Management Protocol (SNMP) enterprise manager, which can then open up trouble tickets. "This process does not exist today," he said.

The Internet Engineering Task Force (IETF) recently announced an RDBMS management information base that defines a standard for storing management data about database systems so it can be collected by an SNMP-based system.

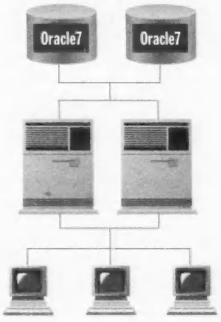
However, the IETF standard addresses only one piece of the puzzle. Meanwhile, a number of vendors are working on their own proprietary application management agents, Frank said. "The question is who can get an intelligent agent into the key RDBMSs first."

Potential rivals to IBM and Legent include HP, Candle Corp., Tivoli Systems, Inc., OpenVision, Inc. and Microsoft Corp.

The Legent/IBM agent will eventually support SNMP Versions 1 and 2, as well as the Object Management Group's Common Object Request Broker Architecture and the Desktop Management Task Force's Desktop Management Interface, the vendors said.

Oracle7 Parallel Server: Breaking the Single Server Limit.

Applications built using a first-generation client/server database cannot access data on more than one server computer without a lot of extra programming. In contrast, the Oracle7 Parallel Server database enables applications to access data on multiple server computers just as if all the data was stored on a single server. Which is one reason why 9 out of the top 10 Fortune 500 companies run Oracle7 on their parallel systems.

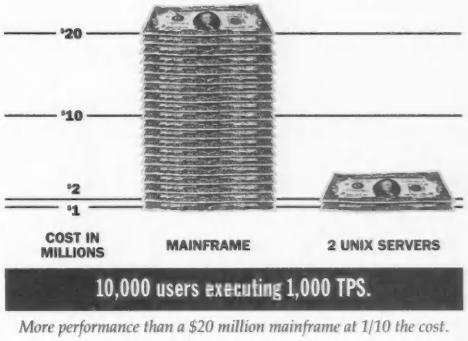


Speed and Scalability

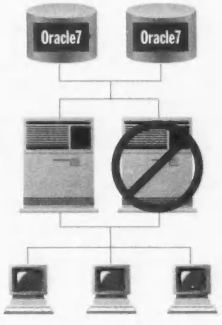
Performance is increased simply by adding another server. Two UNIX servers running Oracle7 were independently certified as supporting 10,000 users running 1,000 TPC-A transactions per second.

Reduced Cost

UNIX computers running Oracle7 Parallel Server support more users and more transactions per second than a mainframe. The cost savings are enormous.



More performance than a $20 million mainframe at 1/10 the cost.



Reliability

Parallel servers offer high reliability because there is no single point of failure. If one server goes down, Oracle7 allows other server(s) to continue running your application.

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News Shorts

Chicago to enter beta testing soon

Microsoft Corp. plans to eventually send the broad end-user beta copy of Chicago to hundreds of thousands of users. The first phase of the beta, set for the end of this month, will be limited to a few hundred users, company officials said last week. The second phase of the beta in May will go to about 10,000 users.

Teleport to offer less expensive Centrex

Teleport Communications Group, the country's first alternative access carrier, last week became the first to offer Centrex services. Teleport will launch its TCG services in New York, Boston and Chicago, with other cities to follow. Pricing has not been set, but a spokesperson said customers could see savings of 5% to 15% over local-exchange company Centrex rates.

Macintosh software for Sun, HP

Apple Computer, Inc. is expected to disclose on Tuesday that Macintosh applications will run on **Hewlett-Packard Co.**'s HP/UX and **Sun Microsystems, Inc.**'s Solaris operating systems. HP Vice President Wim Roelandts last week confirmed that HP/UX will soon support Macintosh applications, but Sun and Apple declined to comment. Still missing, however, is IBM, which has pledged to run Macintosh software on its RS/6000 Unix boxes.

Tandem has parallel relational database

Tandem Computers, Inc. is expected to boost its client/server strategy this week with a parallel processing version of its NonStop/SQL relational database for servers. Also expected is a joint venture with **Micro Focus Corp.** to build a parallel interface to IBM mainframes' CICS transaction monitor. The new products will allow Tandem database servers to handle thousands of client requests at telephone, banking and retail companies, Tandem said.

Lotus ups support ante

Lotus Development Corp. is scaling back its free support and adding several new fee-based support programs for its Notes and CC:Mail communications packages, the vendor said last week. Specifically, the company reduced free CC:Mail and Notes support from 90 to 30 days and added toll charges. Users of the desktop applications will still receive 90-day free support but must pay their own toll charges. One new communications program gives Notes sites access (via Notes) to the technical information database used by Lotus technicians for $20 to $50 per month. Another option gives user sites a dedicated senior support analyst for $35,000 per year.

If you want fast LANs, sign up here

A vendor coalition is expected today to announce the formation of the **100VG-AnyLAN Forum**, an information-sharing group for organizations interested in HP, IBM and AT&T's proposed 100M bit/sec. networking topology. The IEEE 802.12 subcommittee is reviewing 100VG-AnyLAN as a possible industry standard for high-speed networking.

SHORT TAKES **Ameritech Corp.** and **British Columbia Systems Corp.**, a Canadian government firm, will form a joint venture to make state, county and federal data available on-line. . . . The **Chicago Stock Exchange** has appointed Glen W. Beldon to the new post of executive vice president of technology. . . . **Infonet Services Corp.** has added Integrated Services Digital Network access to its InfoLAN LAN-to-LAN value-added network. . . . **HP** last week cut prices by up to 20% on its HP 9000 Series 700 workstation line.

More news shorts, *page 16*

NCR sites wary

CONTINUED FROM PAGE 1

customer-focused teams will be negative for me," said Michael Garrison, manufacturing and industrial engineering manager at State Industries.

His local account representative was transferred last month, placing State Industries' account in the hands of the Atlanta office. Garrison said one of the reasons he originally chose NCR over other vendors was the proximity of a local sales rep. The absence of such "will probably influence my buying decisions in the future," Garrison warned.

Ups and downs

Users rated NCR/AT&T higher in product delivery but lower in technology leadership, customer support and integration of lines under CEO Jerre Stead's year-old reign

Performance since 1991	Performance under new CEO	Business measures
3.9	3.8	Technology leadership
3.7	3.5	Customer support
3.5	3.6	Product deliveries
3.4	3.3	Integration of product lines
3.2	3.2	Pricing vs. its competitors

Ratings are based on a scale of 1 to 5 where 5 is very good. Based on a minimum of 45 NCR sites surveyed by First March Research between Feb. 28 and March 10.

David Barrett, vice president of information technology at Invesco Funds Group, Inc., a mutual funds group in Denver that runs an NCR 3600 massively parallel computer, an NCR 3550 server, as well as other systems, said he hopes the customer-focused tactic will enable AT&T Global Information Solutions to respond wholly and in a more coordinated manner to Invesco's entire enterprise computing requirements.

Not so hot

The service initiatives are part of AT&T Global Information Solutions' overall restructuring efforts, which followed its unspectacular financial performance. Last year, the unit saw its revenue climb a meager 2% to $7.26 billion. For the year, it posted a $171 million loss, aided by $268 million in restructuring charges, which the unit took to offset pension costs and an early retirement program.

"There have been big problems with the NCR acquisition, and AT&T admitted that by taking the restructuring charges," said Craig W. Ellis, a senior telecommunications analyst at Wheat First Butcher & Singer, a Richmond, Va., brokerage.

This year could prove more promising. A year after taking the helm of AT&T Global Information Solutions, Chief Executive Officer Jerre L. Stead has plotted a course that many industry pundits believe will return the company to profitability.

Jerre L. Stead, *CEO of AT&T Global Information Solutions, acknowledges that stronger efforts to merge NCR with AT&T's computer products group would have led to better products today*

For example, Stead has made a series of aggressive restructuring moves by applying a formula similar to the one that helped him return AT&T's Global Business Communications Systems division to profitability within nine months.

In addition to cutting AT&T Global Information Solutions' head count by 16%, from 53,000 employees worldwide to 45,400, Stead has created new financial incentives for the sales staff and sharpened the focus on six key vertical customer industries — most noticeably the banking and retail sectors.

In an interview, Stead said the bulk of the AT&T unit's restructuring is behind it. "We'll be solidly in the black in 1994 and beyond."

Stead's efforts come in the wake of what analysts call a poorly focused and bureaucratic NCR that shuffled through the late 1980s and early 1990s. NCR reacted slowly to the industry's shift to distributed processing and client/server computing, only to watch open systems pioneers such as Sun Microsystems, Inc. and Hewlett-Packard Co. begin luring away the vendor's financial customers.

And when NCR reacted by developing its System 3000 servers and workstations, those introductions were hindered by development delays in Intel Corp.'s processors and software modifications required to support symmetric multiprocessing.

Cyclical matters

The company also set unrealistic goals for delivery of software products with lengthy sales cycles. One such product was Cooperation, an ambitious groupware package that originally drew a great deal of interest but has thus far had a marginal impact on the market.

In fact, the vendor's groupware products, which include ProcessIt, have long selling cycles and adoption periods that require customers to make a great deal of organizational change. As a result, Cooperation's lengthy sales cycles made it difficult for NCR to meet its original delivery and revenue schedules, according to Nina Lytton, president of Open Systems Advisor, a Boston-based consultancy.

The combination of these factors helped prevent NCR from keeping pace with the rest of the industry and finally began affecting its bottom line last year. "They didn't meet their revenue and profit goals because they didn't meet their product goals, and their marketing campaigns were poorly organized," noted Michael Goulde, a senior consultant at Patricia Seybold Group in Boston.

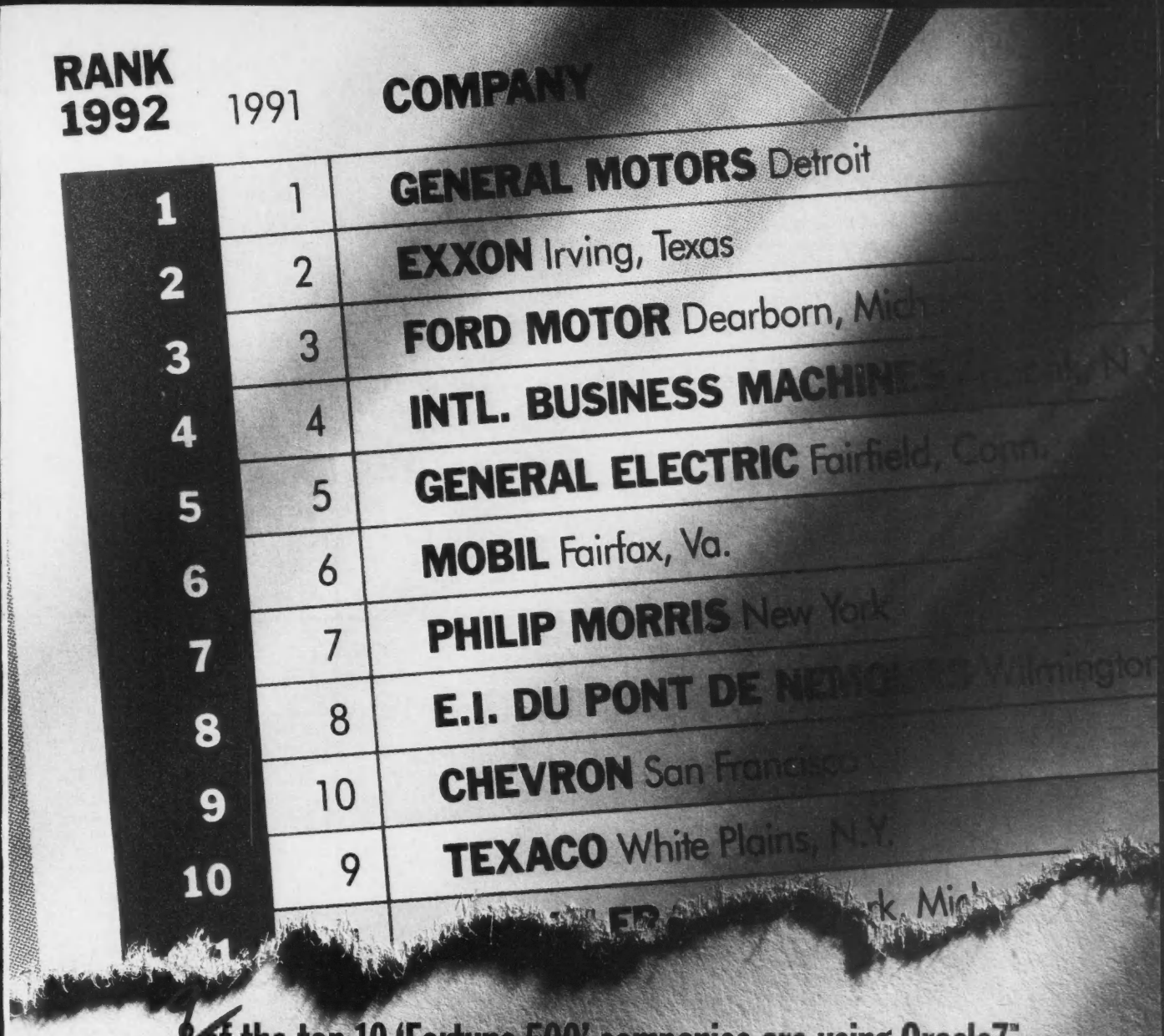
However, AT&T Global Information Solutions' technological strengths are starting to show. As users begin to transform their mainframe computers into enterprise servers and data repositories, some users and analysts are expecting massively parallel processing (MPP) systems to fill the void for high-end computing. Most analysts said they believe the AT&T unit has a two- to three-year jump on MPP newcomers such as IBM and Unisys Corp.

Things are looking up

Currently, AT&T Global Information Solutions has a 46% share of the $500 million commercial parallel processing market, which is expected to grow 20% annually, according to Dataquest, Inc., a market research company in San Jose, Calif. In fact, the former NCR's pioneering efforts in the MPP arena have helped it win several large customer contracts, including Wal-Mart Stores, Inc., Delta Air Lines and Kansas City Power & Light Co.

"We were impressed by the system's ability to access varieties of data such as general ledger and customer billing from a single source," said Forrest Grapes, manager of technical services at the Kansas City, Mo., utility.

Yet it is the AT&T/NCR combination that led 800 Flowers, a Westbury, N.Y., teleflorist, to become an NCR customer, said Chris McCann, vice president of operations. "The main driving force behind our going with NCR was our relationship with AT&T," he said.



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Court awards AMD right to use Intel code

By Michael Fitzgerald
SUNNYVALE, CALIF.

In what could prove to be a major victory for Advanced Micro Devices, Inc. (AMD) in its legal struggle with Intel Corp., a jury last week granted AMD the right to sell a microprocessor containing built-in Intel code.

The decision came after a judge threw out an earlier ruling in Intel's favor because the chip giant withheld several documents.

The decision means AMD will not have to produce 486s with clean-room microcode or pay potentially crushing damages to Intel.

"It's a big positive for AMD because it allows them to ship their original 486 chips free and clear," said Charles F. Boucher, an analyst at Hambrecht & Quist, Inc. in San Francisco. He said, however, that the decision would do nothing to fix AMD's capacity problems.

While the case focused on the microcode in the 287 math coprocessor, the decision is believed to set a precedent for other Intel suits still pending against AMD regarding Intel's 80386 and 1486 processors. While Intel appeals, the other cases will proceed based on issues other than AMD's right to use microcode. F. Thomas Dunlap, Intel's chief legal counsel, cited separate control programs on the 486 as the main point it will press, as well as three other issues.

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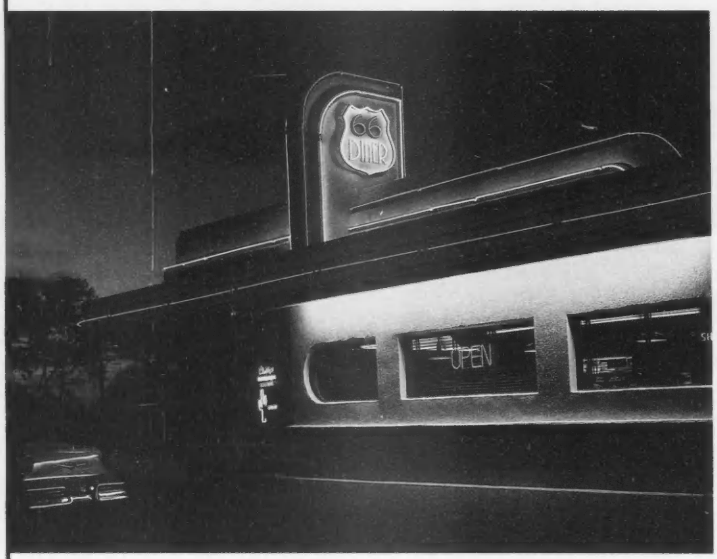

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Data transfer

CONTINUED FROM PAGE 1

of up to 512K bit/sec.

Pricing for individual ISDN connections varies, but sources said users can expect to pay $160 per month for such a configuration. Leased-line charges average $400 per month for a 56K bit/sec. transmission rate, the sources said.

Moreover, the access device will have multiplexing intelligence that allows it to automatically provide the necessary bandwidth to transmit a given file, which means users will pay only for the bandwidth they need. The device will also perform compression, which is Symplex's strength. The company offers data compression products for the networking market. Direct Route is its first internetworking product.

While pricing for the Direct Route access device was not available, sources estimated it will range from $1,000 to $7,000. It is also protocol-independent so it does not have to manage protocol tables and algorithms, thereby reducing the cost and complexity of the box.

"This sounds like it is exactly what we need, and I expect this will totally change the complexion of our business," said Michael Benes, president of Benes Communications, a graphics design firm in Lexington, Mass., that will be a beta site.

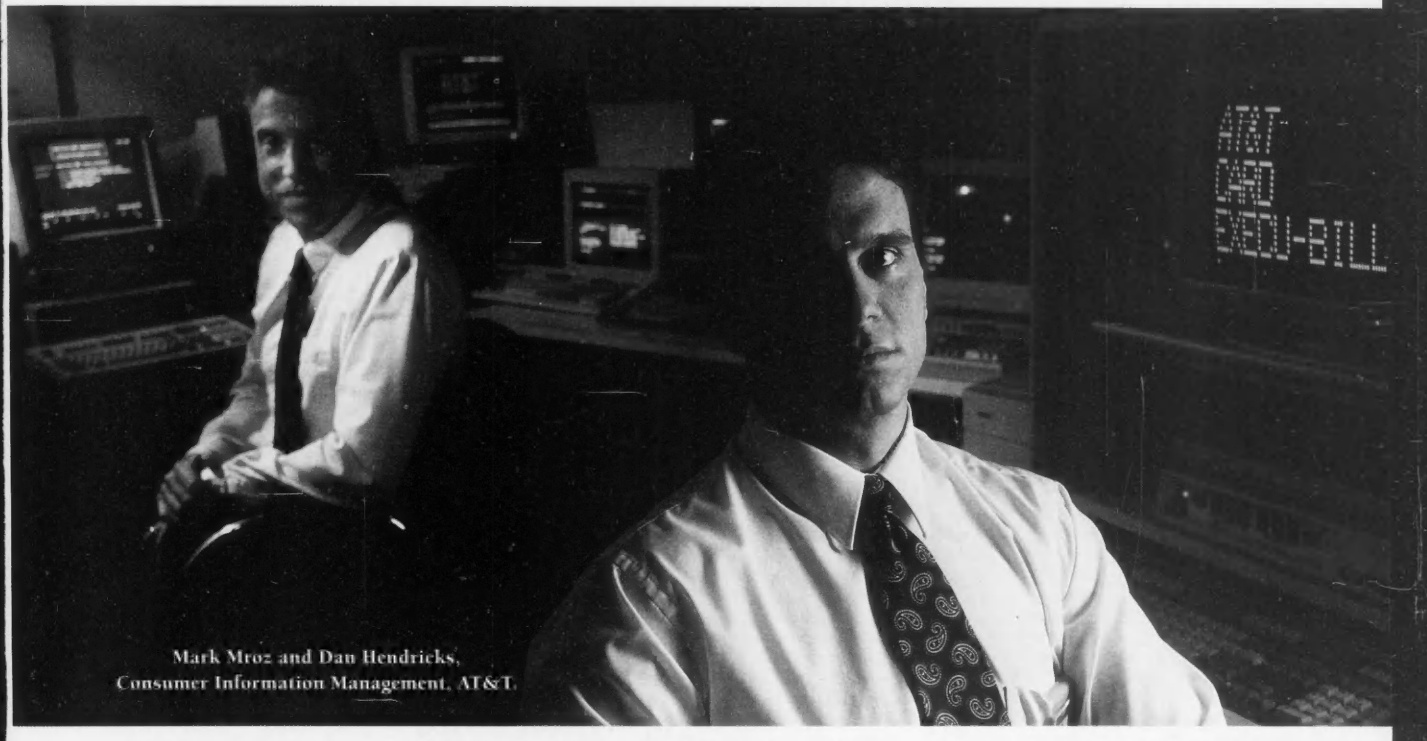
For example, Benes currently sends graphics files to clients and printers on disks via Federal Express Corp. rather than via leased lines, which he said are too expensive. Direct Route would allow him to send files directly to clients' screens and allow him to do business with remotes sites for which Fedex is impractical. "It could potentially double our business overnight," Benes said.

Analysts compared Direct Route's capabilities to ATM and said it is the first system to fully leverage the benefits of ISDN. It will bring T1-comparable performance to small and medium-size companies, which often cannot justify the expense of leased lines.

"With Direct Route, users will get a lot of the benefits they expect from ATM tomorrow from ISDN today — and at a very affordable cost," said Kathryn Korostoff, president of Sage Network Research, Inc. in Natick, Mass.

However, analysts said Symplex faces a major hurdle in convincing users that ISDN is here and that it works. The technology has been around for roughly 15 years, and the industry has been slow to adopt it. For example, there is still no cohesive ISDN standard for developers to conform to, so users have been hesitant to embrace it, they said.

"We were born mainframers. Then Micro Focus introduced us to a new way of life."



Mark Mroz and Dan Hendricks, Consumer Information Management, AT&T.

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Dan Hendricks and Mark Mroz in Consumer Information Management at AT&T are part of a 1000 strong programming staff in Piscataway, New Jersey.

As mainframe programmers, they both know what it's like to be 300th in line for compilation.

"A typical fix to a program, maybe a quick edit and compile or something, could easily take you half a day on the mainframe," says Mroz.

They began using the Micro Focus Offloading Solutions two years ago and found "everything we could do on the mainframe we could do with Micro Focus COBOL". The PC is so much faster. There are still times when I have to go back to the mainframe, but I really do not like it. I try and steer clear of it, if possible."

"With Micro Focus on the PC, I can put my code together in half the time. Using Animator®, I can test it out thoroughly and make sure I'm producing quality code before I ship anything out. All within a couple of hours," says Hendricks.

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Defense mergers

CONTINUED FROM PAGE 1

market, Raytheon last week said it would cut 4,400 jobs, or about 7% of its work force. A Raytheon spokeswoman declined to speculate how the layoffs, mostly in Massachusetts, might affect IS. But she noted that the Lexington, Mass.-based contractor has been consolidating other support functions such as accounting, finance and human resources.

Industry watchers warned that the union of Grumman and Martin Marietta, if approved next month, would not be painless.

Not an easy process

"Both companies are operating on mainframe technology that is largely obsolete," said Graham Kemp, president of G2 Research in Palo Alto, Calif. "Both are trying to move into client/server architectures. Any one of the aerospace firms are in that same boat."

The standardization and integration of electronic mail, electronic data interchange, data and telephone systems will pose huge technical challenges, Kemp said.

Joseph R. Cleveland, vice president of internal IS at Martin Marietta, pointed to his company's acquisition of General Electric Aerospace Systems last summer as a "template" for how Grumman's IS operations might be absorbed.

Martin Marietta is strongly committed to client/server computing and open systems, Cleveland said. "Since we merged with GE Aerospace in 1992, we have had no more mainframe application starts," he said. "All our new applications are client/server-based."

20% savings

Since late last year, Martin Marietta has been recentralizing IS from its astronautics, electronics, missiles, materials and other business units into a "virtual organization" in Orlando, Fla. Cleveland said the approach shifts computing resources to where they are most needed and should reduce IS staffing levels and costs by 20%.

Peter Aseritis, an aerospace analyst at First Boston Corp., estimated that the merged companies would trim 10% of their combined work force in the next couple of years, especially at Grumman headquarters. Martin Marietta now employs 93,000, Grumman 18,000 and Northrop about 30,000.

But IS may not be as hard hit by the layoffs as other disciplines, according to Richard Wonder, national director at the IS division of employment agency Robert Half International, Inc.

"IS people are most resilient to economic downturns and problems," especially business-savvy systems analysts and network specialists willing to relocate, he said.

Victor Janulitis, chief executive officer of Positive Support Review, a Santa Monica, Calif., consultancy, said that even with layoffs, cost savings are not guaranteed.

"There may be diseconomies of scale and some dissatisfaction when people realize they do not really get two for the price of one," Janulitis said.

Tony Velocci, business editor at trade publication *Aviation Week and Space Technology* said, "With the addition of Grumman and their complementary technology and programs, the new company will have critical mass in a multitude of core areas."

Takeover target

Profile of IS operation at Grumman Corp., Bethpage, N.Y.

Top IS executive:	William D. Rizzardi, CIO; vice president, information management
IS staff:	Approximately 1,300
Annual IS budget:	$135 million (down 5% from 1993)
IS structure:	Centralized/decentralized
Processor value:	$75 million
Number of PCs and terminals:	18,000
Major initiatives:	Renovation of IS structure, re-engineering of financial systems onto client/server platforms

Far-reaching impact

The technology impact of a successful merger between Martin Marietta and Grumman extends far beyond the firms' data center walls.

Both companies operate commercial systems integration and outsourcing businesses that analysts said could benefit from combining forces — especially outside the defense sector.

"In the government market, this deal pushes Martin into a first-rank position" with CSC Index and EDS, said Graham Kemp, president of G2 Research. "In the commercial market, it doesn't change their standing too much."

Analysts said neither firm has had great luck in nonmilitary contracts. Only about 15% of Grumman's contracts are outside the U.S. government.

Martin Marietta's IS division earned about $500 million in 1992, an 11% drop that analysts and the company blamed on declining defense spending.

Grumman Data Systems & Services had revenue of $411 million in 1992, a 7% drop also attributed to government cutbacks.

But Grumman has ambitious plans to expand into growing markets such as health care and financial services. One recent victory: an image management system for Salomon Brothers, Inc.

"Grumman is one of the most underappreciated companies in the industry," said Tony Velocci, business editor at *Aviation Week and Space Technology*, an aerospace trade newspaper. "Grumman is the world's largest integrator of supercomputers. There is an extraordinary range of information systems and systems integration technologies between the two companies."

Recent nondefense wins by Martin Marietta include a $144 million contract to integrate the Federal Aviation Administration's new air traffic computer, communications and radar systems. — *Joseph Maglitta*

General Motors

CONTINUED FROM PAGE 1

Development Corp., which is supplying its Notes groupware platform, is said to have made its largest single Notes sale to date to EDS for the project.

Similarly, Compaq Computer Corp., which got the nod to supply the desktop and laptop systems, is believed to be looking at one of its largest nongovernment sales ever. Neither Compaq nor Lotus would specify the size of their contracts for COE, however.

Established direction

Analysts noted that a push toward a consistent information systems infrastructure is not new at GM.

"EDS' entire charter ever since [then-GM chairman] Roger Smith bought them [in 1984] has been to hammer away at the proliferation of systems within GM and move to commercial packages," said Martin Piszczalski, an independent industry analyst in Ann Arbor, Mich.

Automakers have been notorious for developing homegrown software, and GM led its competitors in this regard, Piszczalski said.

But other observers pointed to EDS' long learning process at GM, noting that when GM acquired it, EDS had no automotive experience and little background in distributed systems. "It's a different managerial challenge to handle a myriad of PCs than a few mainframes," said Gregory Gruska, a principal consultant at The Third Generation, Inc., consultancy in Orchard Lake, Mich.

There is a growing consensus that common platforms in both hardware and software are necessary to curb what can be crippling complexity for enterprise computing, Piszczalski said.

"Clearly, the best way [to shorten the time it takes to bring forth new products] is to have multidiscipline vehicle teams in marketing, finance and engineering," Piszczalski said. As these teams have been geographically dispersed, "it becomes essential they can communicate with their peers both within a department and between departments."

Other automotive observers, however, argued that the COE/EDS effort is really a practical response to the massive organizational consolidations that have swept through GM.

Significantly, before taking over the GM helm, Jack Smith was in charge of GM Europe, which successfully put in place a "consistent" office environment strategy three years ago (see box).

According to sources at GM and EDS, all the contracts for COE were, by design, signed within 90 days of one another in mid-1993. The sources said the contracts are structured on a per-user/per-month basis, allowing GM to ramp up the new system without incurring capital spikes.

While GM would not confirm the worth or structure of the contracts, company officials said the EDS deployment and subsequent operations will cost GM the same as or less than the company spends for its computing needs today.

Meanwhile, EDS officials said they are privately thrilled with the magnitude of the COE initiative, hinting that they will be able to take the approach and graft it onto other large users.

Analysts agreed that EDS has as much as GM to gain from the success of the giant project.

David Marshak, vice president and senior consultant at Patricia Seybold Group in Boston, focused particularly on the size of the Notes deployment envisioned by COE. "One of the large opportunities in consulting and integration will be consulting practices built around Notes, and [COE] propels EDS into the forefront of that activity," he said.

Auto automation

GM's initiative is the latest in a series of networking and office projects implemented by the Big 3 manufacturers. Here are some highlights:

General Motors

[redacted] GM launches 36-month project called the Consistent Office Environment.

Ford

[redacted] Ford computerizes design technology to get every department involved in production of one part — including design, manufacturing, shipping, purchasing and packaging.

[redacted] Ford uses a single system for releasing products. The system serves 10,000 people worldwide.

Chrysler

May 1990 Chrysler installs two Digital VAX systems to handle explosive growth in its advanced manufacturing group.

October 1992 Chrysler picks MCI's Global Data Network to help automate worldwide auto assembly operations.

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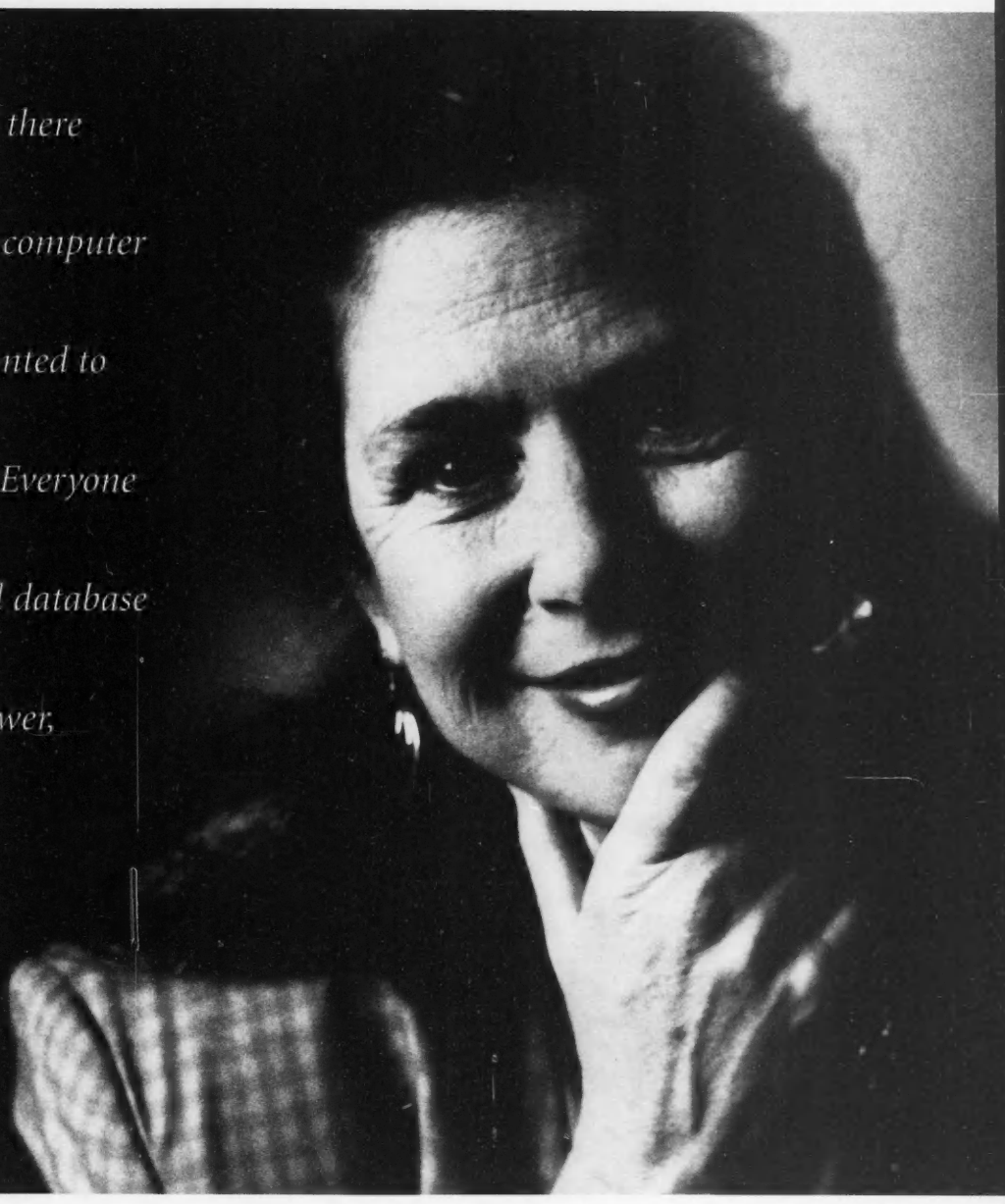

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Apple gambles on Power Mac

Bets PowerPC desktops will aid faltering fortune

By Mark Halper

Apple Computer, Inc. today embarks on a mission to turn around its misfortunes in the corporate market with the launch of desktop machines based on the PowerPC chip. Company officials said they hope to sell 1 million units in the next year.

Users and analysts last week said that Apple should achieve its sales goal even though it has so far signed up only 150 developers for the new platform.

Among the reasons for its optimism was the new Power Macintosh's compatibility with existing Macintosh software. Even though the old software cannot take advantage of the PowerPC's speed, early assessments are that it runs problem-free: Users buying new Macintoshes will more likely buy a machine for which Apple is promising more native software.

Programs written for Macintoshes based on Motorola, Inc.'s 68000 chips will run under emulation on the new line, but Apple executives said there should be no discernible difference in performance. Native applications, however, will run two to four times faster than 68000 applications.

"I'm very pleased, especially with the compatibility, which I was expecting to be problematic, but it's not," said Michael Keithley, information systems director at Creative Artists Agency, a Beverly Hills, Calif., talent agency.

"They need to get more [developers] going, but the fact that it has such solid emulation has eased the need for native applications, which will come over time," he said.

Pieter Hartsook, editor of "The Hartsook Letter," concurred. "Based on what I've seen of emulation, and with the schedule I've seen for native versions, a million is conservative," he said. "I'm predicting 1.1 million by the end of the calendar year."

He added that users of lower-range 68000-based Macintoshes will actually notice a performance boost under emulation, while users of higher-end Macintoshes will notice a slight decrease in performance. Users also cited the Power Macintosh's ability to run Windows software, though speeds are slower than on Intel Corp. PCs.

On your mark, get set...

Apple said last week that about 50 native applications will ship within 30 days of the Power Macintosh's launch today. Those include Claris Corp.'s ClarisWorks and ClarisImpact, Adobe Systems, Inc.'s Photoshop, Aldus Corp.'s PageMaker and Freehand, WordPerfect Corp.'s WordPerfect 3.0, Lotus Development Corp.'s CC:Mail and Quark, Inc.'s QuarkXPress.

Microsoft Corp. will not be among the early providers of native software for the Power Macintosh, Apple said.

With the three-model Power Macintosh line, Apple vowed it will remove the hex that has plagued its 68000-based Macintosh line for a decade. Compared with Intel-based PCs, the Macintosh line has long been higher priced, slower and less compatible with PC software.

Delivery timetable

The following list indicates when various PowerPC chips will be used in the Power Macintosh line

Chip	Type/time frame
601	1994
603	Low power; early 1995 in PowerBooks
604	Desktop; will replace 601 in mid-1995
620	High performance; early 1994/late 1995

But the PowerPC 601 chip driving the new line weighs in at 60 SpecInt92, compared to 64.5 for Intel's fastest-shipping Pentium, according to figures provided by Apple.

The 601's floating-point performance, however, outpaces the Pentium's at 80 Specfp92 vs. 56.9. Those figures, Apple executives said, will give the Power Macintosh a distinct edge not only in technical and financial programming but also in the burgeoning multimedia field.

The Macintosh "finally has the processing power we need for multimedia machines," said Joe Harris, president of Midx Worldwide, Inc., a New York-based multimedia consulting firm. Harris, who until recently ran a Macintosh shop at NBC's television stations division, said he is recommending the Macintosh over Intel-based PCs for broadcast purposes.

"The ability to run Windows and the Macintosh operating system is very attractive to us," said Timothy Yancy, unit manager in customer service automated systems at Southern California Edison Co. in Rosemead, Calif.

Pricing for the new Power Macintoshes starts at $1,819 for a 60-MHz 6100/60 with a 160M-byte hard drive, $2,899 for a 66-MHz 7100/66 with a 250M-byte hard drive and $4,500 for an 80-MHz 8100/80 with a 250M-byte hard drive.

Apple is committed to implementing the PowerPC chip, made by IBM and Motorola, across all of its platforms in the next year, said Brodie Keast, a vice president at Apple's Personal Computer Division.

The company will begin with midrange to high-end machines today, implementing the PowerPC in about one-third of all Macintoshes built by the end of this year.

Apple will also work the chip into PowerBooks and lower-end machines next year, Keast said. By the end of 1995, about 80% of all Macintosh computers will use the PowerPC chip, the company said.

Paul Kerr, product manager at Insignia Solutions, Inc., which is making emulation software for the Power Macintosh, noted that a Windows application would run on a Power Macintosh at about the same speed as on a 386 or a 486SX.

First Pentium clone ships

By Michael Fitzgerald
MILPITAS, CALIF.

Forgotten but not gone, 8-year-old NexGen will today become the first company to ship a clone of Intel Corp.'s Pentium chip.

NexGen is negotiating with IBM Microelectronics to build the cloned processor.

Like Pentium, NexGen's NX586 is a superscalar processor. But it has twice the on-board cache and a built-in Level 2 cache controller, and it is already shipping, thus beating both Advanced Micro Devices, Inc. and Cyrix Corp. to market with a Pentium-class processor.

Xxcal, a software testing laboratory, rated the NX586 fully binary-compatible with Intel software.

"It's the first time Intel has had competition this early in its product cycle," said Michael Slater, editor in chief of "Microprocessor Report," a newsletter in Sebastopol, Calif.

Slater cautioned that he does not expect to see NexGen pose a threat to Intel, despite its 486-priced Pentium work-alike. Rather, he thinks NexGen will garner a small piece of the market, simply because Intel is so dominant.

In fact, NexGen expects to sell only 100,000 chips this year, according to NexGen President and Chief Executive Officer Atiq Raza.

Four small U.S. hardware vendors — Tangent Computer Corp., Compu-Tek International, Inc., Adisys Corp. and Lucky Computer Co. — will announce systems that use the NX586 processor.

Priced at less than $2,000 to start, these companies should ship systems "almost immediately," Raza said. A number of Taiwanese motherboard makers will demonstrate NX586 motherboards at this week's CeBIT '94 show in Hannover, Germany.

NexGen will price the 60-MHz version of its chip at $450 vs. Intel's new DX4, which costs $475 for a 75-MHz version.

Go figure

A NexGen 586 system with a 60-MHz NX586, 8M bytes of RAM and a 340M-byte hard drive could be assembled for as little as $1,567 in raw materials costs. With a $400 markup, a hardware vendor could make a 21% gross margin on the box.

The NX586 also comes in a $506 66-MHz version, but it does not challenge the performance of the new Pentium P54C chips [CW, March 7]. NexGen is now shipping a version that supports the Video Electronics Standards Association VL local bus and will this year release a version that supports Intel's Peripheral Component Interconnect local bus.

NexGen also built into its chip a layer called RISC86, which breaks down software instructions into faster RISC code.

A separate floating-point coprocessor sells for $87. The company skipped the built-in floating-point unit because so few Intel-based applications require floating-point, according to Raza.

Raza said the NX586 is a new design that does not infringe on Intel's patents. Having IBM as a foundry may be key in helping NexGen evade Intel's lawyers because IBM has broad patent cross-licenses with Intel. Cyrix's similar relationship with another foundry has helped it stay in the Intel clone market.

Talks target PowerMac clones

By Michael Fitzgerald
and Ed Scannell

Apple Computer, Inc. is in serious talks with longtime competitor Compaq Computer Corp. to get Compaq to build a Power Macintosh clone, sources close to both companies said last week.

A Compaq spokesman denied that negotiations were under way, saying there were "no such plans." Apple declined to comment.

If Apple were indeed to persuade Compaq to build a Power Macintosh clone, it could spur demand for the PowerPC outside of Apple's installed base, thereby threatening the lock Intel Corp. has on the microprocessor market.

The two archrivals would have different reasons for considering a deal. Apple needs Compaq to give PowerPC the boost it requires to be credible in the marketplace, while Compaq could position itself as the dominant PowerPC clone maker, the sources said.

But building a PowerPC clone could threaten Compaq's status as Intel's second largest customer and its preferred vendor status with Microsoft Corp.

Among the industry observers convinced the Compaq/Apple deal will happen is Will Zachmann, president of Canopus Research, Inc. in Duxbury, Mass. "Apple will define the PowerPC Reference Platform as a Mac and then license it to a limited number of vendors," he said last week. "Apple's plan is a brilliant one. They'll give themselves at least a six- to 12-month head start against vendors [that] license Power Macs, but they'll overcome concern about Power Macs' Apple-only proprietary strategy."

Zachmann said Apple's PowerPC-based Macintoshes will be a major success. "Both IBM and Microsoft are underestimating the role Apple will play" with their new systems, he said.

Microsoft to extend file-sharing Mail server

By Lynda Radosevich

While Microsoft Corp. is flexing its marketing muscle over its upcoming client/server messaging architecture, officials last week said the company is preparing to patch up some problems and extend services in the current file-sharing Microsoft Mail server.

If Microsoft follows through, it should offer relief to some of what analysts estimate are 2.5 million Mail users. Many users have complained about the current file-sharing Mail, yet they will not be ready to move to the client/server version, in part because it requires a Windows NT server.

"People aren't going to run out and just jump into the client/server E-mail system," said Mark Tebbe, president of Lante Corp., a systems integrator in Chicago. Rather, many will want to step into it by first fixing the bugs in the current file-sharing version, he said.

Low on the list

But while fixes are on the agenda, they are not Microsoft's first priority and will not be ready for at least three months after the client/server Enterprise Messaging Server (EMS) ships in the third quarter, a spokeswoman said last week.

"I've just been pulling my hair out lately trying to make [Mail] work well for us, and it's just not working," said Ed Wilk, a network manager at WHDH-TV in Boston. Meanwhile, the client/server updates "sound great, and it's wonderful to talk about what's going to happen years from now, but I need to fix problems with what I have now. It seems like they've totally dropped the ball on the DOS version," Wilk said.

For example, he said he has trouble getting the DOS-based Mail directory to exchange information with Novell, Inc.'s NetWare bindery.

Greg Scott, a computing service manager at Oregon State University in Corvallis, said one issue he faces is separately administering message-storing files for the DOS and Windows clients.

"The information for Windows is stored in a separate area than the mail messages for DOS," Scott said. "If you choose to synchronize the two, in essence you have two copies of every message that comes in." In addition to added administration, that runs up the amount of space the system occupies, he said.

Other users identified problems with specifying routing paths between different message servers and installing and managing gateways.

In response, Microsoft officials said last week that in the new shared-file Microsoft Mail server (SFS), messages from DOS, Windows and other clients can be stored in the same file on the server or directly in the client software. Users will be able to use the same utility to administer all the messages, said Jim Wright, a Mail product manager.

Additionally, Microsoft will update the SFS directory, routing and administrative features and will work on improving X.400, Internet and fax connectivity, said Laura Jennings, manager of the messaging business unit.

SFS will use the same universal Mail client [CW, March 7] that the client/server EMS will use. It will also enable SFS users to use new features such as shared folders. However, because of the limited nature of file-sharing electronic mail, SFS users may have to deploy another server machine to run those capabilities, Wright said.

Microsoft said it intends to tailor SFS for use in remote offices or at small to medium-size companies with roughly 50 users per server. In those cases, users may want to keep Mail on the NetWare file server rather than install a separate Windows NT-based application server, Jennings acknowledged.

While the updated SFS should ease some of the problems, users at several large sites said they are ready to move to the client/server version soon.

Messaging to bridge ID divide. See page 55.

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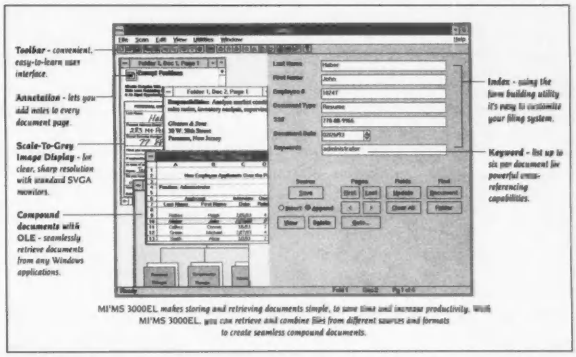

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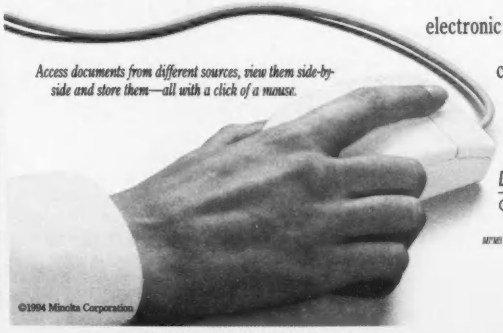

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News Shorts

The Internet channel proliferates

Continental Cablevision, Inc. and **Performance Systems International, Inc.** in Herndon, Va., last week announced initial delivery of Internet services over Continental's fiber-optic trunk and cable TV network in Cambridge, Mass. The new service, called PSI-Cable, supports TCP/IP on Ethernet and Token Ring LANs at speeds of up to 1.5M bit/sec. Separately, CompuServe Information Services announced a commercial on-line service offering a full gateway and front end to the Internet.

Convex joins massively parallel race

Convex Computer Corp. plans this week to jump into the massively parallel processing fray with the introduction of its Exemplar system, which supports up to 128 of Hewlett-Packard Co.'s PA-7100 RISC microprocessors. Exemplar will initially target engineering and scientific applications, but Convex eventually hopes to sell it to commercial information systems environments.

Office for Power Mac debuts

Microsoft Corp. will announce today that it will ship Power Macintosh versions of its Office 4.0 applications suite, as well as Works and FoxPro, this summer. It will also ship a version of Office 4.0 for 680x0-based Macintoshes in the same time frame, a company official said.

FCC rules for caller privacy

The **Federal Communications Commission** last week adopted rules for the interstate transmission of caller numbers to computer-integrated telephony systems, such as those for retrieving customer files. The rules, to take effect in April 1995, require free per-call blocking for consumers who request privacy. Also, the reuse or sale of the number will be prohibited without the customer's consent.

Pint-size point of sale

The Commonwealth of Virginia's Department of Alcohol Beverage Control has issued a $7.8 million contract to **Digital Equipment Corp.** to replace its present cash register system with a point-of-sale network. Under terms of the agreement, Digital will provide more than 600 DECpos terminals and software packages to support the network.

ASK and you shall receive

The ASK Group, Inc. has negotiated a "standstill agreement" with its two largest creditors that lets the financially troubled firm draw money against existing loans, even though its cash on hand falls below specified levels at the banks, ASK said last week. ASK has 60 days to prepare a financial management plan acceptable to the creditors or they will deem ASK in violation of the loan covenants.

SHORT TAKES The **state of Washington** has selected Chicago-based **Andersen Consulting** to design the information system for the state's health care reform initiative.... **Transarc Corp.** is expected to announce that it will support Windows clients in its Encina transaction processing product line for distributed computing.... As expected, **Hewlett-Packard Co.** unveiled a high-end addition to its NetServer family, as well as enhancements to its midrange model.... **Wiltel International, Inc.** in Tulsa, Okla., last week inked an agreement with Cuba's national telephone company to provide the first fiber-optic telecommunications link between Cuba and the U.S.

X/Open moves beyond Unix mission

Users gaining influence, setting priorities for open system specs

By Jean S. Bozman
NEW ORLEANS

■ Faced with the responsibility of putting their stamp of approval on a growing list of Unix and open system standards, X/Open Co. officials last week stressed the need to broaden the consortium's base of support among users and software vendors.

"Just to be able to survive in the environment we have today, you can't be a dinosaur. You've got to change. You've got to adapt," said Denis Brown, chairman of the X/Open User Council, at an X/Open conference here. Brown is general manager at systems integrator PRC, Inc.'s integrated document management systems unit. "So if X/Open's going to survive and prosper, it has to be in a constant reinvention mode."

A broader focus on enterprisewide platforms — beyond Unix — is increasingly important to some vocal user council members.

In the Desktop Requirements Topics Group, "we're all for one set of services for all environments," said Geoff Coupe, an open standards manager at Shell Internationale Petroleum Maatschappij B.V. in The Hague, Netherlands. "It's interoperability, whether someone's sitting in front of Windows or Unix or a Macintosh."

Membership makeup

The membership mix at X/Open is roughly half system vendor "shareholders" such as IBM and Digital Equipment Corp., which pay about $560,000 yearly, and about half corporate users and independent software vendors, which pay fees ranging from $11,250 to $22,500 yearly.

User input influential

Users have steadily gained influence as X/Open, a $18 million nonprofit firm based in Reading, England, shifted to a user-driven requirements process just over a year ago.

The requirements process is hammered out through user task forces where customers define their priorities and needs for open system products. The next step is for vendors to factor those requirements into their product specifications and plans.

"It's very positive. The Top 20 items on the work plan come from the users rather than the individual manufacturers," said one British government user, who asked not to be identified. "If you look at the requirements, you're automatically looking at a broader definition of what open systems are, including PCs and Unix."

X/Open is exploring new ways to get vendors and users to fund its activities. For example, X/Open Chief Technical Officer Mike Lambert said vendors that sign on for "fast-track" certification will be first in line for testing.

"If you've got a specification that you think can be fast-tracked, we're prepared to direct resources to support that," Lambert said.

Documents distributed at the conference reveal that top management, including X/Open Chief Executive Officer Geoff Morris, are discussing several ways to broaden the standard-setting body's mission beyond Unix — including the possibility of becoming a for-profit corporation. But an X/Open spokesman insisted, "It has never been our intention to become a for-profit corporation."

"The whole discussion is how can we accelerate the pace of getting all parts of the industry to participate," said Bob Lewin, vice president of marketing operations at X/Open. "We want to establish value-added programs for a reasonable fee so that users and vendors will fund certain activities."

The closer attention paid to the concerns of information systems managers has meant that "users have been able to express themselves more forcefully since the requirements process went into effect 15 months ago," said John Minter, a user from Inland Revenue's information technology office in Telford, England. "Now there is a continuous process for user input."

X/Open

Change is inevitable, X/Open users said, although it is hard to say what shape it will take as other Unix standards bodies reorganize [CW, March 7]. During the past year, X/Open has defined its role as that of systems integrator for open systems components, ranging from operating systems to application programming interfaces (API) to objects (see box).

Piling it on

Industry analysts said X/Open is forced to seek more funding as demands grow on its 60-member staff to certify and test all Unix compatibility standards, such as the new Spec 1170 APIs for Unix operating systems, the Common Open Software Environment's Common Desktop Environment interfaces and the Open Software Foundation's Distributed Computing Environment. But X/Open has no plans to expand its core staff, spokesman Jeff Hansen said.

"They're in danger of taking on too much," said Paul McGuckin, a Unix analyst at Gartner Group, Inc. in Santa Clara, Calif., who did not attend the X/Open conference. X/Open wants to give users more of a say, he said, to gain "a groundswell of user support that would allow them to really do an excellent job on all the things they've undertaken."

Standing by its brands

X/Open is ready to deliver on its promise to "brand" three key components of the OSF's DCE this year, said Mike Lambert, X/Open's chief technical officer.

After testing for interoperability among open systems platforms, X/Open plans to brand DCE's Remote Procedure Call, Time Service API and Directory Service API. X/Open also plans to certify certain Open Systems Interconnect (OSI) APIs and X.400 Mail's electronic data interchange messaging API this year, he added.

But X/Open executives emphasized that the firm will not spend resources duplicating work under way at other standards groups.

For example, it will not work on interoperability standards being forged by the Europe-based SPIRIT group of hardware vendors and telephone companies.

And Christopher Stone, president of the Object Management Group (OMG) in Framingham, Mass., said X/Open will act as a partner in distributing the OMG's technical specifications, including the Common Object Request Broker Architecture interoperability standard.

—Jean S. Bozman

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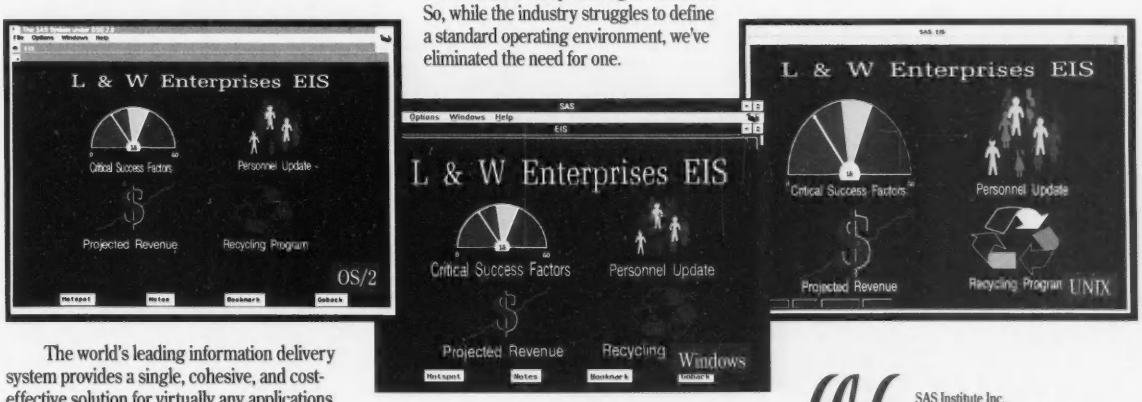

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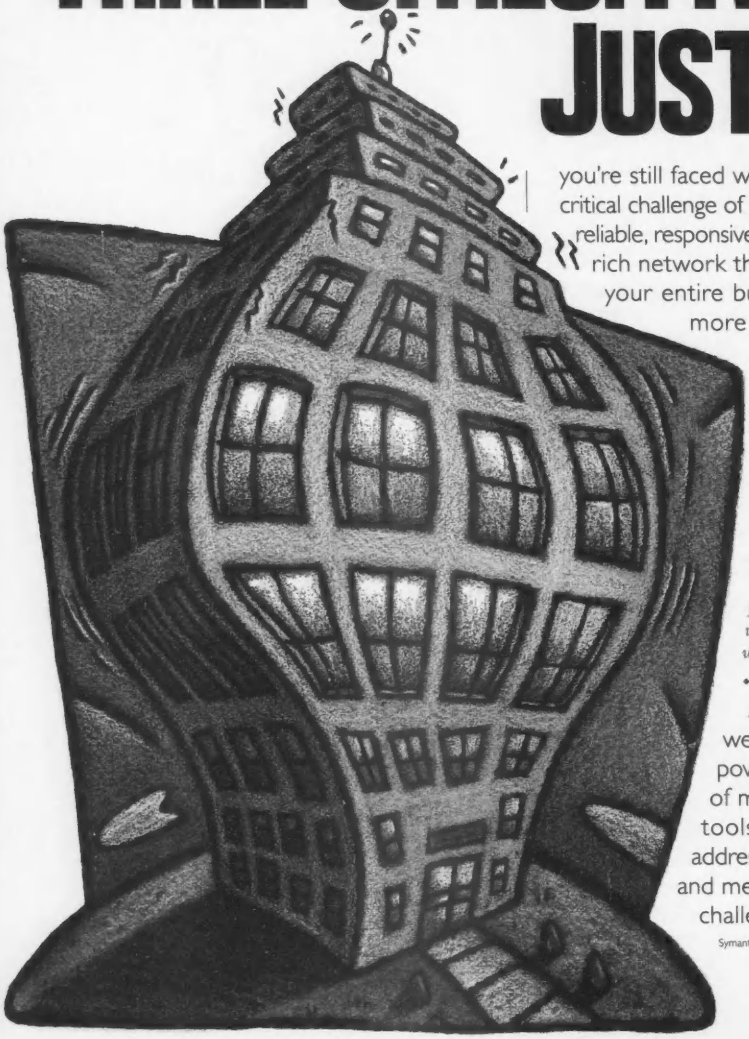

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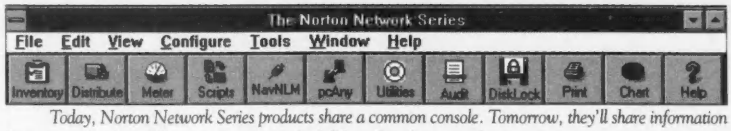

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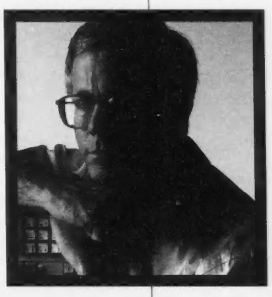

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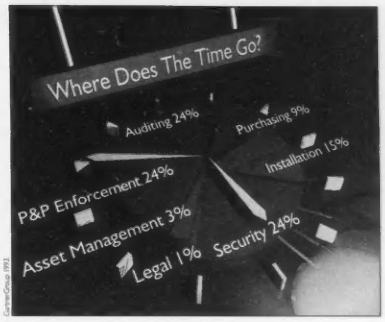

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DEC catching up with beefed up PC servers

By Craig Stedman

Trying to become more than a bit player in the PC server market, Digital Equipment Corp. plans this week to debut a bulked-up line of file and print servers built around Intel Corp.'s Pentium chip and the Peripheral Component Interconnect (PCI) bus.

Analysts said the new servers are an improvement over previous models, but they still need features such as better systems management to really be a threat to the likes of Compaq Computer Corp. Users, meanwhile, remain wary of Digital's pricing.

Due out in mid-April, the uniprocessor file and print engines will be followed by a series of Pentium-based application servers next fall. Those machines will support two CPUs and include features such as error correcting code memory, archival storage and hot-swapping of peripherals, according to executives from Digital's PC unit.

The new DECpc XL Server family will be pitched as offering more features for less money compared with the older DECpc ST servers. The STs "were basically PCs on their sides" with a small presence in the market, said Chuck Venter, an analyst at Meta Group, Inc. in Westport, Conn.

Digital seems to be "doing a better job than they have in the past," Venter said. "But they haven't really caught up on the curve yet." Digital has more work to do, particularly on systems management, before it can match market leaders such as Compaq, he added.

Steve Petrofsky, Digital's PC server product manager, said capabilities for managing distributed DECpc XL systems from a single machine are under development. The management software and add-in boards for the remote servers should ship in July, he said.

Digital also has to overcome a perception among some users that its PCs are on the expensive side. "From the digging I've done, they're a little bit pricey," said Brian Ritberger, network engineer in publishing systems at the *Sacramento Bee* newspaper in Sacramento, Calif.

The *Bee* uses Digital's Pathworks LAN software but has shied away from its PCs, Ritberger said. The newspaper generally buys PC servers from Compaq, although Ritberger said he will at least look at the DECpc XLs.

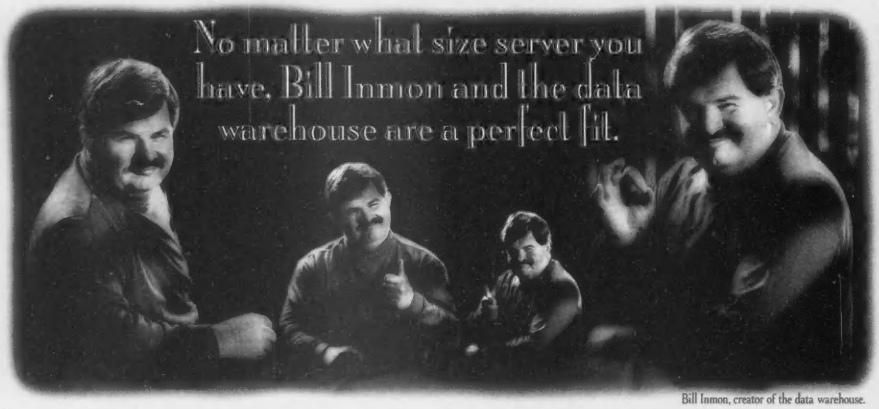
Better deal elsewhere

Steve Ruger, MIS manager at Smith Industries Ltd., an aerospace firm in Malvern, Pa., that uses a VAX server for its Pathworks network, said he would expect to get better prices on a PC server from Compaq or Dell Computer Corp.

Hardware pricing on the DECpc XL Server line starts at $3,699 for a 66-MHz 486DX2-based model with 8M bytes of memory and a 535M-byte Fast SCSI disk drive; a 60-MHz Pentium machine with 16M bytes of memory costs $4,699. Those prices are "within reason but not especially aggressive," Venter said.

However, Brad Day, an analyst at Dataquest, Inc. in Framingham, Mass., said Digital's internal production of PCI chip sets and storage devices should eventually give the vendor cost advantages after the server line is completed in the fall and volume begins to increase.

"From a product point of view, I think they've connected all the right dots," Day said. "They're new to the server game, but they're going to be a very strong player." Digital's support for 11 server and network operating systems is the most extensive of any full-service PC vendor, he noted.



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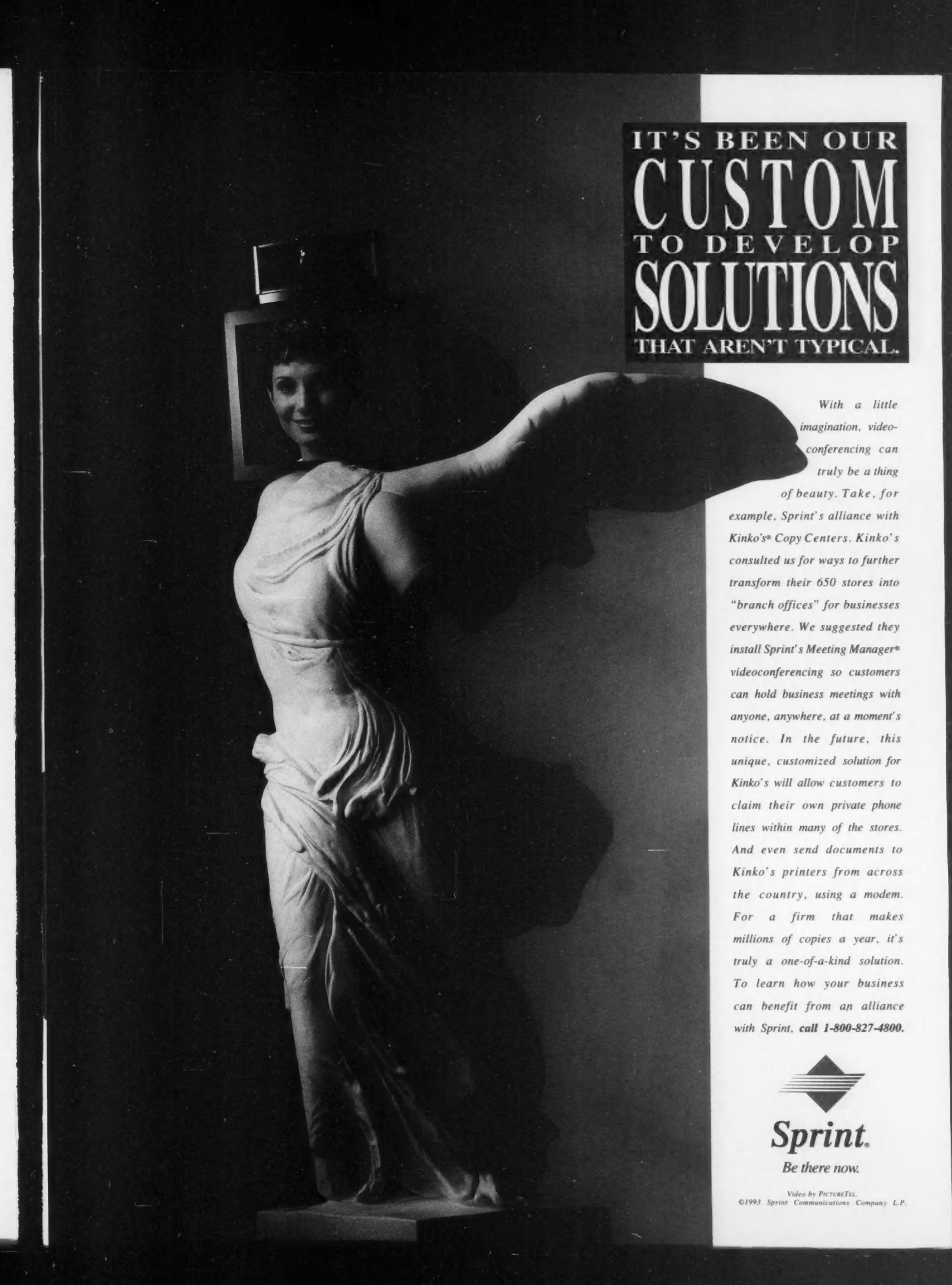

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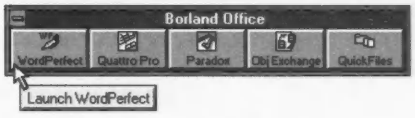

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Infonet pact offers 75% worldwide control

Microsoft's Hermes used to distribute software, manage PC-related costs

By Ed Scannell

Infonet Services Corp. has signed a deal with Microsoft Corp. and several other vendors to deliver a series of enterprise management services — including global software distribution — to multinational corporations.

At the center of the deal is Microsoft's upcoming Hermes system-level software, which reportedly lets information systems managers distribute and manage applications on hundreds of PCs from a central location. The agreement was designed to give Hermes a marketing boost when it becomes available sometime in the second quarter.

"This initiative will enable MIS directors to regain control over worldwide distribution of new software, applications and equipment," said Jose Collazo, Infonet's chairman and chief executive officer. "In reality, we are providing [MIS managers with] worldwide visibility at the desktop."

Also key is the fact that the services should give IS managers better control of about 75% of the total costs involved in owning and maintaining PCs, based on research conducted by Gartner Group, Inc. in Stamford, Conn.

"We have research that says each application installed on a LAN costs about $167 a year to install, maintain and support. But there is a growing cost associated with that," said Dan Shelley, product manager at Microsoft's enterprise group. That growing cost "could be significantly reduced if you have a systems management product like Hermes."

In addition to distributing software, Hermes provides IS professionals with complete inventory, software management, troubleshooting and performance management tools for microcomputers.

Added value key

While interested, some IS professionals said they will wait to see what value Infonet brings Hermes over and above what they could get from Microsoft before buying into the services.

"Infonet will have to bring some more goodies to the table for Hermes; otherwise I can just buy it from Microsoft," said Don Flanders, an IS manager at a large corporate account in Gaithersburg, Md. "We also want to see what Hermes looks like in finished form before we make any sort of decision."

Infonet executives responded that they will supply Hermes with additional value through a worldwide network accessible in 150 countries.

"We can give [Hermes] real global connections to the multinationals to install and manage [software] licenses," said Antonio Inman, an Infonet executive. "It is the missing link, since we all downsized off mainframes only to discover we could no longer manage our desktops."

IS departments can use Infonet's wide-area network services to receive their PC-based software and then distribute it to their worldwide offices. They can also use Infonet's globally managed InfoLAN for faster LAN-to-WAN communications or the company's worldwide Public or Virtual Private Data Network Services, a spokesman said.

Besides Infonet and Microsoft, other companies involved in the deal include Software Spectrum, Inc. in Garland, Texas, and software distributor Corporate Software, Inc. in Canton, Mass.

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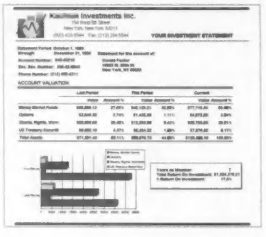

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The Apple Report On PowerPC

Number 3 – Applications Accelerated For Power Macintosh

On average, a Power Macintosh achieves two to four times the performance of 68040 and 80486 machines running the same programs.

If you use applications that do floating-point mathematical calculations, your performance levels could be up to ten times those of the same program running on a 68040 machine—and several times faster than the fastest Pentium system–based computers.

A Power Macintosh offers unprecedented compatibility between Macintosh, MS-DOS and Windows environments, thanks to an emulation program called SoftWindows, which licenses Windows code from Microsoft.

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Accelerated for Macintosh with PowerPC™

But the real benefit of the new Power Macintosh computers can be seen with new applications that take advantage of the PowerPC chip's advanced capabilities.

These applications, often called native applications, will offer two to four times the performance of programs available for the fastest Macintosh computers today.

Developers writing native applications also report that these applications perform at levels better than their Windows counterparts running on Intel Pentium system–based computers.

Major developers on board.

Right now, the world's leading developers are updating their most popular and memory-intensive programs to take full advantage of Power Macintosh computers.

In fact, Apple has been working closely with more than 200 major third-party developers since 1992 to create powerful new versions of their applications.

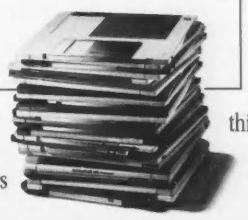
And since software development kits became widely available in January, hundreds of additional developers have begun the move to Power Macintosh computers.

PowerPC technology enables them to build unprecedented speed and functionality into applications for the Macintosh system. Developers everywhere are eager to exploit these new capabilities.

What about software?

A Power Macintosh will run virtually all of your existing Macintosh system–based programs. The real benefit of a Macintosh with PowerPC technology, however, is with applications optimized to take advantage of the new chip's advanced capabilities. Here are some of the native applications that are available now or will be out in the next few months:

ACI 4th Dimension	*Frame FrameMaker*
Adobe Dimensions	*Insignia Solutions SoftWindows*
Adobe Illustrator	*Microsoft Excel*
Adobe Photoshop	*Microsoft Word*
Adobe Premiere	*Specular Infini-D*
Aldus FreeHand	*Strata StudioPro*
Aldus PageMaker	*VideoFusion VideoFusion*
Alias Sketch!	*Virtus WalkThrough*
Claris ClarisWorks	*Wolfram Mathematica*
Fractal Design Painter	*WordPerfect WordPerfect*



Do more in less time.

What do the advanced capabilities of native applications mean to you? You'll spend significantly less time waiting for your computer to redraw or recalculate or re-anything. That means you'll have more time to create and refine your work, to apply new concepts, to test options.

You can also expect to see new kinds of applications—software that is both more intelligent and easier to use.

Developers will be exploring new features in areas such as intelligent help, 3-D design, video, animation, speech recognition and text-to-speech conversion.

Many of these new functions simply wouldn't be practical without the superior processing capabilities of a RISC chip and innovative Macintosh technology.

Why RISC?

The new Power Macintosh computers are the first personal computers with RISC (Reduced Instruction Set Computing) chips—ultra high performance chips previously available only in workstations.

(In fact, many workstation developers are now writing applications for the Macintosh platform for the first time.)

RISC chips are smaller and less complex than comparably powered CISC chips. So they cost less to produce. Which means that Power Macintosh computers offer a significant advantage in price as well as performance. In the best of all possible worlds, all personal computers would offer you this kind of power.

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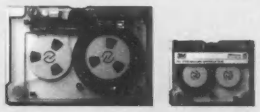

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The common denominator of business around the world.

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3M *Reliability*

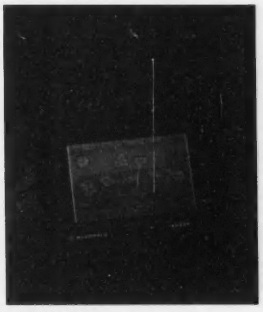
Mobile '94 offers reality check

By Michael Fitzgerald
SAN JOSE, CALIF.

Widespread use of interactive wireless communications is further off than anticipated last year. That is because today's wireless networks, Ardis and RAM Mobile Data, are expensive and alternatives such as Cellular Digital Packet Data (CDPD) are encountering delays.

That reality brought a somber group of vendors to Mobile '94 here last week. Many found themselves contemplating a future that appears bleak when compared with the hype and hoopla of last year.

"What's going on here is everybody wants to be the next Microsoft, but they're all scared of going in the wrong direction," said Mary Meeker, an analyst at Morgan Stanley and Co.



Motorola's Envoy *handheld debuted with third-party support*

The winner is...

The vendor community now understands it will take significantly longer to establish the winner in the wireless communications market, Meeker said. As an example, she cited the difficulty a panel of vendors had defining personal communications services (PCS), one of the most vaunted next-generation wireless services.

"People are sobered," said Ken Dulaney, an analyst at Gartner Group, Inc. in Santa Clara, Calif.

Some of the sobriety stems from delays in implementing CDPD at its main proponent, McCaw Cellular Communications, Inc. McCaw is now at least six months behind in its plans.

Some CDPD backers, however, are beginning their rollouts. Greg Oslan, director of wireless data marketing at Ameritech Cellular Services in Hoffman Estates, Ill., said Ameritech will begin testing its CDPD network in Chicago with three major customers in the next two weeks. Pactel Cellular, a Pacific Telesis company, is also testing CDPD in San Diego and San Francisco and will announce a deployment schedule for all of California in a couple of weeks.

Analysts also pointed out that pricing in the duopolistic vendor environment — set up by the Federal Communications Commission to limit each market to two vendors — remains too high for users to broadly adopt the new technologies.

But Paul Heller, principal of Heller Consulting in Boulder, Colo., predicted that even cutting service prices by 75% would not greatly drive usage because the networks and the relevant software are incomplete.

There was little in the way of new products at the show, although Motorola, Inc. did introduce its Envoy handheld personal communicator. It is based on General Magic, Inc.'s Magic Cap operating system.

Envoy, a 1.7-pound device with built-in paging and two-way wireless messaging service from Radio Mail Corp., will run over the Ardis wireless network. It costs $1,500 and is scheduled to ship this summer.

Motorola has drawn fire for deciding to build several types of personal communicators, but Christopher Galvin, Motorola's president and chief operating officer, defended the decision, saying "the wonderful thing about communications is that everybody has different needs."

Motorola is investing in several technologies, he added, because it remains unclear which one will prove to be the best over time.

Other options

Separately, Ardis put its Personal Mail two-way messaging in a new commercialized package: $69 per month for 200 messages.

Celeritas Technologies Ltd. demonstrated its new modem methodology, which focuses on sending pure input through phone lines rather than using the error-correcting code such as MNP10. Celeritas President Glenn R. Ray said using this method can increase throughput from 400 to 7,400 characters per second using a 14.4 bit/sec. modem. Celeritas has three licensees: Toshiba Corp., Megahertz Corp. and Pacific Bell Telephone.

Pen-based wireless PCs on Conrail trains, page 55. **IBM**'s PDA strategy, page 39.

Microsoft's WinPad garners support

In an effort to upstage General Magic, Microsoft Corp. last week announced additional support for its upcoming At Work for Handhelds operating system, known as WinPad.

Four hardware vendors — NEC Corp., Ing. C. Olivetti & Co., Sharp Corp. and Zenith Data Systems — said they will build WinPad devices. Compaq Computer Corp., Motorola and Toshiba Corp. had already signed on.

Bruce Baker, general manager of Microsoft's handheld systems group, declined to give specifics on the types of products that these companies might develop. Rather, he said each vendor will likely adopt a somewhat different approach to the market.

Microsoft also announced four applications that will run on WinPad. Its own workgroup division said it would develop an application that will let WinPad users connect to Microsoft Mail.

Three smaller companies — Syware, Inc., Saltire Software, Inc. and Navigation Technologies — said they will port their applications to WinPad, addressing specific remote-user markets.

For instance, Syware builds a database access product and Navigation Technologies offers DriverGuide, an application that gives turn-by-turn directions to locations within specific geographic areas.

Baker said WinPad-based machines will ship before the end of the year; however, he declined to be more specific.

— Michael Fitzgerald

IBM's RS/6000 laptop allows users to take AIX on the road

By Jean S. Bozman

IBM's laptop version of the RS/6000 Unix workstation, announced last week, will have its greatest impact on the current crop of IBM workstation users, industry analysts agreed. The 6.9-pound Unix workstation will enable users to take engineering drawings and AIX applications from standard IBM RS/6000 workstations and move them into the field.

The laptop

The IBM RS/6000 laptop workstation is priced at $12,000 for a unit with 16M bytes of memory, 340M bytes of hard-disk storage and a license for AIX 3.2.5. It is manufactured by Tadpole Technologies.

On the road

Early users said the laptop, while pricey at $12,000, lets them take AIX software applications on the road for the first time. "I don't see it as a replacement for the workstations," said Danny LaBlanc, a sales engineer at manufacturing software firm U.S. Data Corp. in Richardson, Texas. "But now our salespeople can use it to demonstrate software to customers."

The RS/6000 Model N40 laptop is a full-function workstation, although its 256-color flat-panel display cannot show the full detail of a 1,280-by-1,024-pixel high-resolution graphics image. Instead, it allows users to pan and zoom over the complete stored image, pulling up sections to view in full detail.

In the office, Model N40 can be plugged into high-resolution displays to show all image details, IBM said.

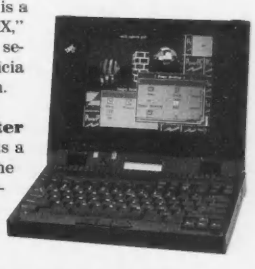
The laptop, which resembles IBM's ThinkPad, is based on the 50-MHz PowerPC 601 RISC chip [CW, Feb. 28] and is scheduled to ship on March 25. It has 16M to 64M bytes of memory and 340M bytes of storage.

Tadpole Technologies, Inc. in Austin, Texas, co-designed the RS/6000 laptop with IBM and manufactures it as well. Tadpole also makes the $10,000 SPARCbook 3 for users of Sun Microsystems, Inc. workstations. But several analysts said they do not expect Tadpole's SPARC and PowerPC units to compete in many user sites because IBM users tend to run AIX-specific applications.

"What you're buying is a portable vehicle for AIX," said Michael Goulde, a senior consultant at Patricia Seybold Group in Boston.

Performance booster

Although each user gets a full license to the RS/6000's AIX 3.2.5 operating system, IBM removed some AIX modules to boost performance. For example, IBM said it removed multiuser support and the Micro Channel device drivers.



The RS/6000 laptop *will not replace workstations*

Industry analysts expect RS/6000 users to buy the laptop mainly for field work, sharing the unit by using removable 3½-inch hard drives.

"If you have five people in your group, you can check it out, use your own [removable] disk, and it's your system," explained John Donovan, a senior consultant at WorkGroup Technologies, Inc., a consulting firm in Hampton, N.H.

Portable office

But single users, such as architects, engineers or software developers, can use the machine to conduct field work or customer visits, early users said.

"I do all of my slide presentations on the computer now," said Ken Hill Jr., vice president of pharmacy sales at PDX, Inc., a pharmacy software supplier in Fort Worth, Texas.

Hill, who has had the unit for more than a month, uses an overhead projector to show on-screen graphics.

Briefs

Job standards set

The American Electronics Association (AEA) has published a guide to voluntary job-skill standards in the electronics industry. The AEA, which wants a government-sponsored national skills certification system, has outlined in the guide general criteria for skills in three areas — manufacturing, pre- and post-sales support and administrative/information services support.

Digital cuts jobs

Digital Equipment Corp. said last week it will cut 6,000 jobs in Europe during the next 12 to 18 months, reducing Digital Europe staffing by about 20%. Weak demand in Europe has received much of the blame for Digital's losses over the last two quarters. The company had 92,300 employees worldwide at the end of 1993 and wants to reach 85,000 by June.

EMC buys RAID maker

EMC Corp. said it will buy the assets of **Array Technology Corp.**, a subsidiary of Tandem Computers, Inc. that makes redundant arrays of inexpensive disks (RAID) for Unix systems. Array's RAID Level 5 technology will be used in a line of Unix RAID devices that EMC plans to ship late this year, the company said.

SHORT TAKES **Network Equipment Technologies, Inc.** has appointed Joseph J. Francesconi president, chief executive officer and board member. Acting CEO John B. Arnold was named chairman. . . . Steven Wright has been appointed president and chief operating officer of **The Dodge Group**. He replaces Frank Dodge, who remains chairman and CEO. . . . **Proteon, Inc.** has appointed Joe DiGiantommaso chief financial officer and vice president of finance. . . . **General Automation** has appointed Robert Bagby president and chief operating officer.

HyperDesk backs off CORBA

By Melinda-Carol Ballou

■ In a surprise move, a struggling HyperDesk Corp. last week announced it is jettisoning its CORBA-compliant object request broker and laying off half of its 60 employees.

Company officials said the revamped organization will focus its energies on moving into the groupware business. In that market, HyperDesk hopes it will be able to better differentiate itself and make some money, according to President Herb Osher.

"It became clear a while back that we couldn't make money in the CORBA business, and [so] we started to accelerate activities in other areas," he explained.

Osher said a number of factors influenced the decision to abandon the company's flagship product, HyperDesk Distributed Object Management System (HD-DOMS). Since object request broker technology is fairly new, HyperDesk spent a lot of time and money educating and promoting. As a result, many accounts purchased development kits but did not deploy applications quickly enough, Osher said.

Handing off objects

A total of 291 corporate developers surveyed in January said they would support the following object standards over the next two years

MULTIPLE RESPONSES ALLOWED

Standard	Respondents
OMG's CORBA	222
Microsoft's OLE	185
IBM's SOM*	88
Sun Microsystems, Inc.'s Project Distributed Objects Everywhere (DOE)*	60
Component Integration Lab's OpenDoc*	55

*These products offer CORBA-compliant object request brokers

Source: Market Perspectives, Inc., Framingham, Mass.

Split market

Moreover, a lack of industry agreement about object standards has stymied the market to some extent by confusing developers, he said. Currently the market is split between Microsoft Corp., with its Object Linking and Embedding, and nearly all other major systems vendors, which are supporting the Object Management Group's (OMG) Common Object Request Broker Architecture (CORBA).

While large vendors such as IBM, Hewlett-Packard Co. and SunSoft, Inc. have deep pockets and could afford to wait to make a profit, HyperDesk, a small third-party software developer in Westboro, Mass., could not, Osher said.

Novell, Inc. purchased a 10% equity in HyperDesk about a year ago and announced that HyperDesk's HD-DOMS technology would be key to providing CORBA compliance for AppWare. But since then the messages from the Orem, Utah-based network system software provider have been unclear. For instance, Novell has also announced support for the Component Integration Laboratories' OpenDoc, which uses IBM's Distributed System Object Model to offer CORBA compliance.

What does the demise of HD-DOMS mean for Novell's AppWare strategy? Osher said HyperDesk shipped the first version of the product to Novell in December. HyperDesk will offer consulting advice and engineers if Novell requests it. Novell officials said they are in discussions with HyperDesk to take control of the technology and that they view this change in circumstance as an opportunity for more direct input.

Still a believer

Osher did express one concern, saying, "My fear is that [our change in direction] will be used as a hammer against the OMG. We're still believers in CORBA, and we believe in our technology. We just couldn't make any money at it."

Other third parties with competitive CORBA-compliant products had similar fears and regretted the HyperDesk departure.

"It's bad news because the market suffers when there are fewer players, and while [HyperDesk] may say there's no room for [independent software vendors] in the object request broker market, it could just be sour grapes on their part," said Annrai O'Toole, vice president of development at Iona Technologies Ltd. in Dublin.

Ironically, the market may just now be shifting, according to other third parties. David Curtis, chief technical officer at Expersoft Corp., another object request broker vendor, said this quarter has been Expersoft's best ever.

"We're seeing a marked increase in the level of seriousness and understanding on the part of developers," Curtis said. "A year ago, we were still struggling with people over vocabulary and defining the fundamental nature of what we do. Now we don't have to do that kind of missionary work. We can talk about what differentiates us."

Handheld software

Geoworks wins a reprieve

By Michael Fitzgerald

Geoworks, long a small-time player in the operating systems market, has a solid shot at a leading role now that Hewlett-Packard Co. and Novell, Inc. have taken a minority stake in the company, analysts said. Geoworks is the maker of an operating system for handheld computers.

The investments should give a lift to Geoworks, which has been considered a dark horse, at best, in the race to capture part of the nascent market for an operating system for handhelds.

"This makes Geos a contender," said Kimball Brown, an analyst at Dataquest, Inc. in San Jose, Calif. He said Geos' tightly written code allows it to run on inexpensive, low-power processors, which could lead to a high-volume market for sub-$300 devices.

For example, HP said it would target this market after completing the deal. Analysts expect HP to build a new version of its 100LX handheld around Geos, perhaps featuring built-in Novell NetWare connectivity.

Thinking ahead

"HP thinks it has the next-generation calculator here," said William Lempesis, president of Lempesis Research in Pleasanton, Calif.

Geoworks is best known for providing the operating system in Zoomer, a personal digital assistant developed by Tandy Corp. and Casio, Inc., and for supplying the operating system in a Sharp Corp. handheld called PT-9000 personal information assistant. But Geoworks Chairman Brian Dougherty hinted that the investments could lead to Geos appearing in an interactive television set-top box.

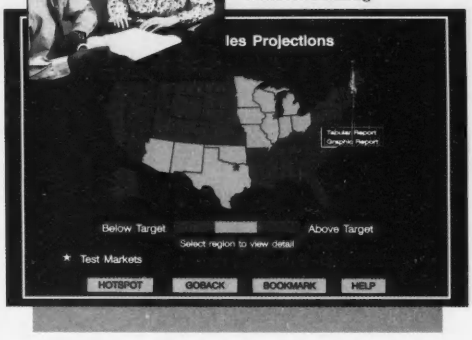
Geoworks Chairman
Brian Dougherty: Watch for Geos in an interactive TV set-top box

"It's an interesting market, but all I can say for now is watch that space," Dougherty said in a show-floor interview at Mobile '94 in San Jose, Calif., last week.

He also said the negotiations with HP and Novell had been under way for close to a year. Negotiations with Motorola, Inc. to build a handheld based on Geos are ongoing, he added.

In addition to its new Envoy handheld, based on General Magic, Inc.'s Magic Cap operating system, Motorola has said it will build handhelds around Apple Computer, Inc.'s Newt operating system and Microsoft Corp.'s At Work for Handhelds.

Business Planning



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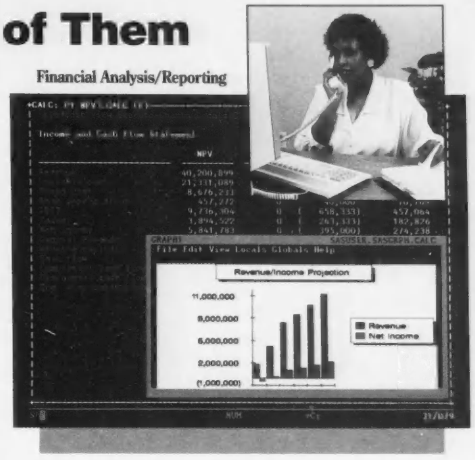

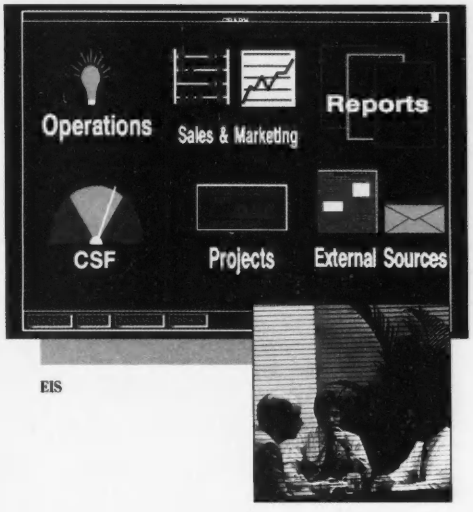

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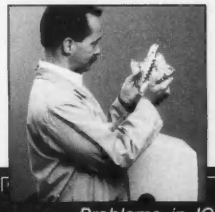

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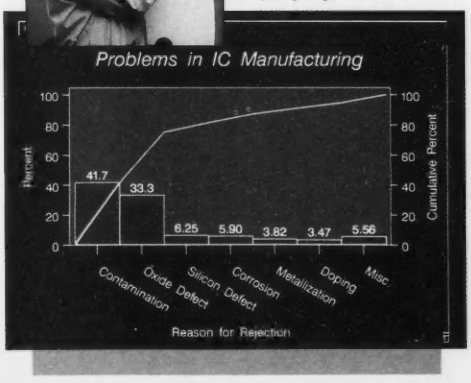

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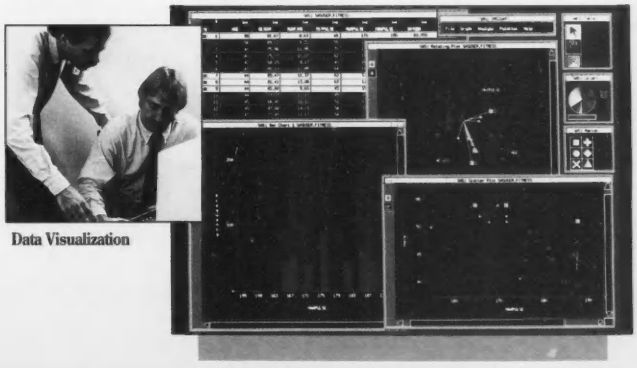

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It's about time

Score this as an unquestionable victory for the customer. Score it further as a bold statement that today's environment is more customer-driven — less vendor-dominated — than ever before, and getting more so all the time.

Next week at UniForum, the big Unix love-in, we should witness the long-overdue merger of various Unix factions. The end product of the merger is still being hammered out as you read this [CW, March. 7]. And there is always a chance that the huge stakes and even huger egos could torpedo the merger, although that doesn't seem likely.

The goal of the merger is to put an end to the redundant and/or competing development efforts between the dominant Unix wanna-bes, namely the Common Open Software Environment (COSE) and the Open Software Foundation (OSF).

Unix has a strange history. The heart of this once-technoid operating system, the hallmarks of which are portability and scalability, was developed in the labs of AT&T long before the company was divided. AT&T sold it to Novell, which then more or less deeded the Unix brand to the independent, vendor-sponsored, user-driven X/Open Co.

Over the years, Unix evolved into an oxymoronic "standard" consisting of various incompatible flavors hyped by different vendors in different camps. What Ken Olsen once dubbed "snake oil" became "mystery oil."

So customers got fed up. Two major studies — one by X/Open [CW, Dec. 5] and the other just released by International Data Group — indicated that customers are clearly turning their buying intentions away from Unix. Amazingly, they say they prefer Microsoft's Windows NT.

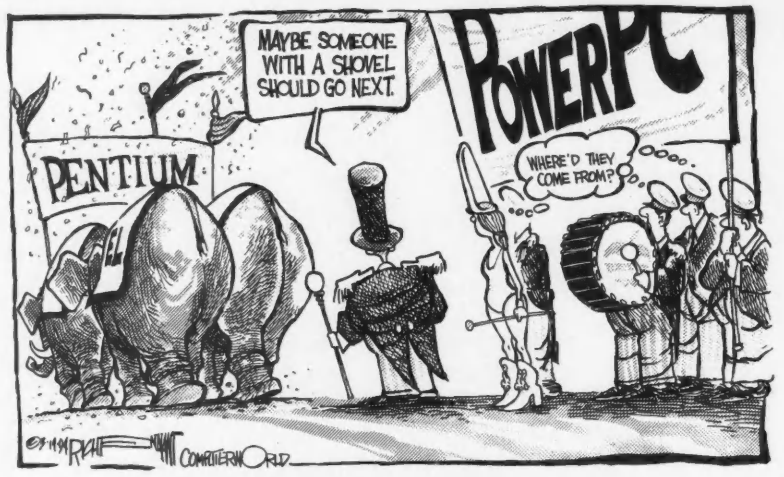
I say amazingly because with NT, there's so little "there" there. Clearly, customers are voting for NT with a prayer, hoping that Microsoft has the clout and sheer muscle to make the proprietary NT an operating system standard. But customers more decidedly are voting against the confusion, chaos and general morass created by the mainstream Unix crowd. They've lived by the sword and now fear dying by it.

The Unix vendors have been driven by the concern that delivering a unified Unix (with, say, common APIs for starters) would inhibit their ability to market differentiated products. That's nonsense. Despite the blatant commoditization of PC hardware, vendors still manage to deliver differentiated products in that market. There's plenty of elbow room for innovation and differentiation in software.

What is needed for any agreement reached next week to work is a mass sublimation of egos at the various Unix providers. The greatest impetus for doing just that is coming loud and clear from the customers. They are tired of your political squabbles. Unix is clearly under the gun and in trouble.

Bill Laberis

Bill Laberis, *Editor in chief*



Privacy concerns no 'silly' matter

Ellis Booker says that concerns about privacy on the information highway are "silly" ["Getting to know you," Viewpoint, Feb. 21]. Then he goes on to say that legislation and voluntary programs will permit consumers to limit disclosure of their information and that many marketers already have voluntary codes of fair information practices. What in the world does he think privacy advocates have been after?

The "silly" part of his column is that it assumes that the information highway will be predominantly a sales medium. I thought the first name of the information data superhighway was supposed to be *information*. If it becomes a 500-channel sales medium and not an information-transfer medium, all the privacy protections in the world won't matter.

Robert Ellis Smith
Privacy Journal
Providence, R.I.

I strongly disagree with Ellis Booker's characterization of the privacy concerns about the information highway as "silly." He may have no qualms about anyone and everyone knowing when he orders *Citizen Kane*, but you would get quite a different reaction from a lesbian in the Midwest, let's say, who orders *Claire of the Moon*.

You may not have your job threatened when your private life becomes public property, but for the 80% of gay men and lesbians in this country who have no civil rights protection, the concern is very real.

Marianne G. C. Seggerman
Stamford, Conn.

Ellis Booker completely misses the fact that the privacy issue is of concern to citizens. The difference is that citizens are interested in keeping their private and political lives from a government that is often interested in eavesdropping on them.

Consider the government's proposed Clipper program. It would let the government unscramble any encrypted message if a judge approves the action. Judging from the way the government has been able to get its way with judges when it was interested in setting up domestic spying projects, it is to our advantage to restrain it — and anyone else — from being able to pry into people's lives.

Igal Dahari
San Francisco

Ellis Booker's sounding of the "privacy alarm" misses an important point. With the coming of the information highway, people will have access to even more data about individual Americans than ever before. It is very important to guard against misuse of that data.

The military has a term for guarding that kind of data: operational security. It involves securing bits of data that taken separately don't mean much but that taken as a whole can lead to information that shouldn't be disclosed.

The hallmarks of American society are the freedoms of speech and the press. The alarmists serve to keep such concerns in the minds of those empowered to assure that they can't easily come true.

Steve Glazewski
Huber Heights, Ohio

A desktop dream

Having been a mainframer for more than 15 years, I find all the hype about desktop operating systems fascinating. I cannot imagine these operating environments will ever have the complexity, security and interoperability of MVS.

MVS has the capability to process thousands of jobs with practically no human intervention. These can be staged and timed to occur simultaneously or over several days. MVS can be restarted and dynamically reexecuted. It is remarkably flexible. Isn't that what open was supposed to be about?

I find it difficult to imagine the monthly payroll job for a large organization being iconized into a graphical user interface product. Somebody could sneeze or drop a pencil on a mouse, and there goes $27 million of a corporation's money.

William T. Voris
Troy, Ohio

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Consolidation makes sense

Jeffrey M. Kaplan and Ellen Kitzis

A number of market research and consulting firms are advising users to take advantage of today's buyer's market to craft the best possible deals for customer support services. They recommend breaking these services into individual pieces and buying from the lowest bidder. While we can't fault the firms for their good intentions, we do question whether this approach makes sense in the long run.

The theory behind the advice goes like this: Basic maintenance services have become a commodity, just like the equipment being fixed, and because there are plenty of companies to choose from, users should pick the firm willing to give the best deal at the lowest price.

Despite some fundamental truths in this brand of advice, Dataquest research reveals that the buyer must still beware. Strictly separating basic fix-it services from value-added services compounds the administrative burden and related costs of managing multiple vendor relationships. Under this strategy, a customer must evaluate a long list of vendors for each level of support — a tedious and time-consuming chore.

By separating these functions artificially just to save money, customers may be costing themselves more. They put themselves in the middle of problem identification and vendor dispatch situations that can lead to extended system downtimes and lost productivity.

The fewer vendors you use, the less finger-pointing you will see. Our research shows a growing number of customers would prefer to reduce the number of vendors they deal with.

For instance, 40% of the more than 300 IS and network managers surveyed by Dataquest in the U.S. would prefer to use a single firm to handle their multivendor network support requirements.

By separating support functions artificially just to save money, customers may be costing themselves more.

An added benefit of a vertically integrated approach to buying support services is the potential synergy created between the customer and the vendor. A vendor with a broad view of a customer's operation is better able to propose proactive measures to prevent costly failures and improve system performance.

In an era when customers are seeking "solutions" rather than "systems" to resolve their business needs, creating a seamless support relationship with key vendors is important.

The advice offered by some consultants to play hardball with vendors when it comes to service agreements has found a receptive audience because many vendors have failed to meet customer expectations. Despite the poor track record of some vendors, customers should be cautious about driving too tough a bargain with service suppliers.

Given today's environment, some vendors may be willing to sign a bare-bones service agreement that would be unprofitable if executed as conceived in the hopes of winning concessions or generating additional charges for services not covered by the contract. This type of arrangement is destined to leave both parties dissatisfied.

Customers should be discerning. They have more options available than ever before, but they need to stay focused on their primary responsibilities. Trying to purchase individual service components piece by piece may result in losing sight of the total picture.

Kaplan is director and Kitzis is vice president of Dataquest, Inc.'s Worldwide Services Group.

Betas going bye-bye?

Michael Schrage

Hypothesis: The quality of enterprise-wide systems software is going to dramatically decline or become radically more expensive.

Why? Because circumstances are conspiring to erase a crucial multi-billion subsidy the software industry has exploited and enjoyed for years. That subsidy is the beta site.

Such a deal. In exchange for an early shot at what vendors claim is a cutting-edge system, the brightest software minds in corporate America commit themselves and their companies to becoming beta sites. The IBMs, Oracles and Digitals essentially get their customers to enhance, debug and refine their systems for free.

Anybody care to tote up the man-hours required to be a beta? Anybody care to examine the opportunity costs? The hard-dollar expenditures? The real cost/benefits?

Back when information technology budgets were growing like kudzu and top management actually believed their companies were getting adequate returns from their technology investments, a persuasive case could be made for going beta. The company could get a technical edge on the competition; the propellerheads in IS could feel they were doing state-of-the-art software (good for morale); and vendors tended to be more responsive to beta sites.

Those were the good old days. Today, everybody's under far greater pressure to do more in less time. If IS isn't being decentralized, it's being outsourced. Budgets are being frozen or ratcheted down. Programmers are being held more accountable for their productivity. *Computerworld*'s surveys show that data processing departments are much less enthusiastic about investing in innovation than before.

Unless there are fundamental changes in beta economics, we are in for an infestation of bugs and plagues of delays.

The existing beta site model is simply not compatible with this environment. A data processing manager may want to commit his people to being a beta, but it's difficult to imagine a CIO explaining the economics of that commitment to the management committee. Where's the payback? Do the economic and competitive benefits of being a beta truly outweigh the costs? Innovation is wonderful, but in an era of downsizing, rightsizing and restructuring, it's going to take a distant second behind managing that client/server transition.

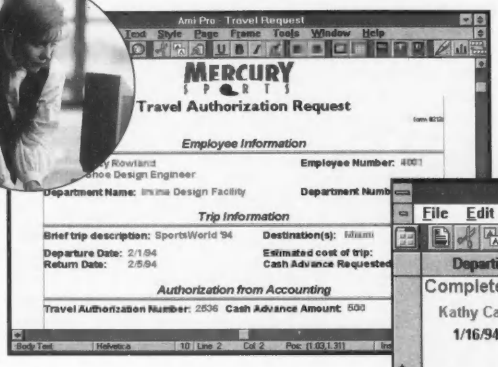
Based purely on anecdotal evidence, it's getting harder for the big firms to get the best companies to be beta sites. They have their own problems. And as the level of system complexity rises, the need for better betas also rises. Unless vendors are prepared to pay hard cash or (gulp) offer royalties for codevelopment, the economic incentive for being a beta simply isn't there. As a direct result, the quality of systems software has no where to go but down.

To be sure, this won't be a problem for small systems software. It's easy for vendors to distribute thousands of beta disks. Besides, if you were cynical, you could make a decent case that Release 1.0 of such a product is a beta version anyway. These suppliers depend on their customers to do their debugging for them.

But unless there are fundamental changes in beta economics for larger systems, we are in for an infestation of bugs and plagues of delays. There's no such thing as a free lunch; there will be no such thing as a free beta site.

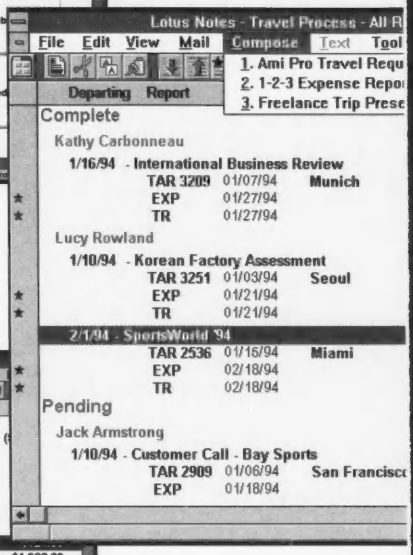
Schrage is a fellow at the MIT Sloan School Center for Coordination Science and the MIT Media Lab. His Internet address is schrage@media-lab.mit.edu.

GETTING SOFTWARE TO WOR
GETTING PEOPLE TO WORK



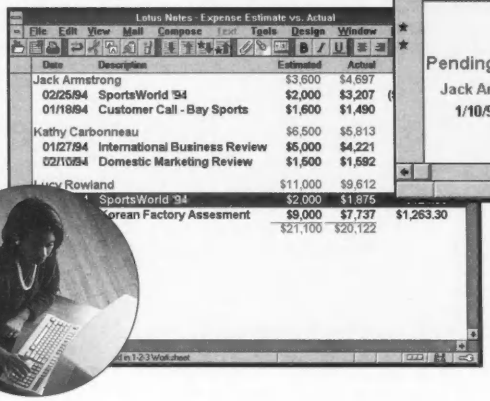
WITH A SIMPLE COMMAND, LUCY LAUNCHES FROM NOTES INTO THE TRAVEL AUTHORIZATION FORM IN **AMI PRO** TO PREPARE FOR HER TRIP TO SPORTS WORLD. NOTES HAS ALREADY FILLED IN MOST OF THE TEMPLATE WITH LUCY'S FILE INFORMATION. SHE FILLS OUT THE REST OF THE INFORMATION AND THE TRAVEL DOCUMENT IN NOTES IS UPDATED.

2



THIS **NOTES** APPLICATION SHOWS HOW A COMPANY CAN AUTOMATE THE TRAVEL PROCESS. HERE, NOTES CONTAINS THE AMI PRO TRAVEL REQUEST, THE FREELANCE TRIP PRESENTATION AND THE 1-2-3 EXPENSE REPORT. ANY AUTHORIZED MEMBER OF LUCY'S WORKGROUP MAY ACCESS, SORT AND REPORT ON THE DATA BECAUSE OF THE NEW NOTES/FX TECHNOLOGY.

1



JANE, THE DEPARTMENT MANAGER, CAN QUICKLY DO A CHECK TO SEE WHO HAS EXCEEDED THEIR PLANNED EXPENSES BY VIEWING FROM WITHIN **NOTES** THE ESTIMATED EXPENSES (FROM AMI PRO) AGAINST THE ACTUAL EXPENSES (FROM 1-2-3).

5

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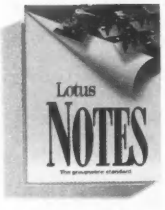

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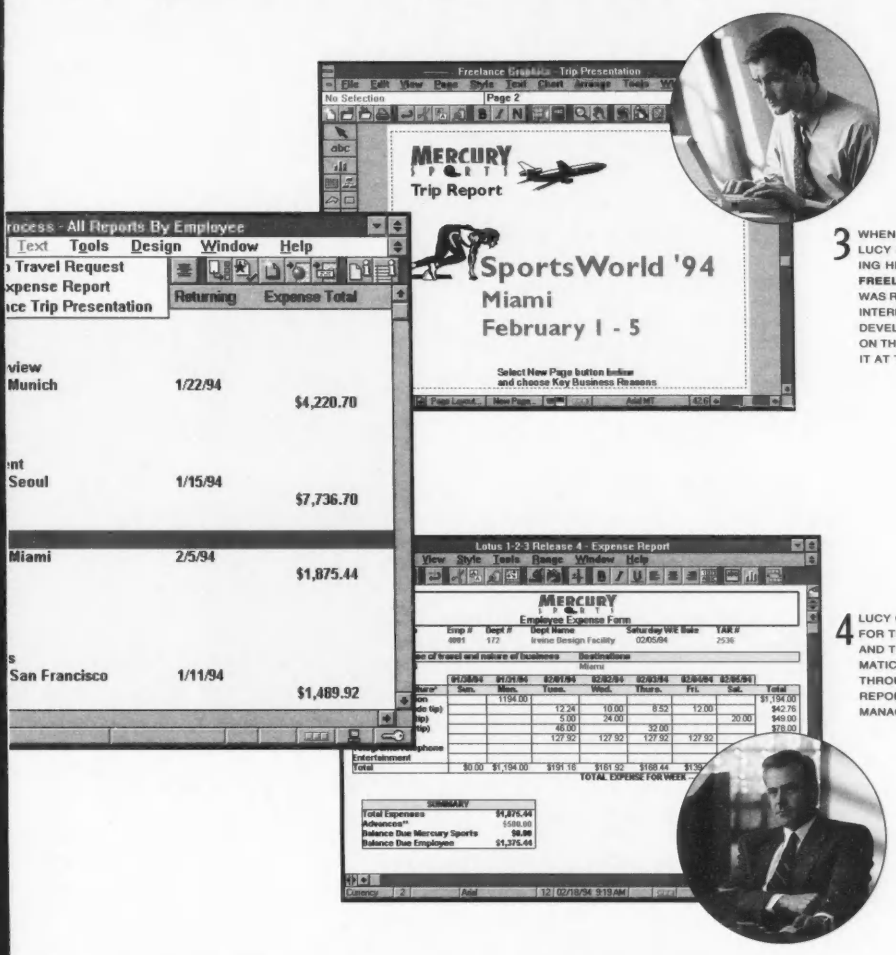
K TOGETHER IS SOMETHING. TOGETHER IS EVERYTHING.



3 WHEN SHE RETURNED FROM HER TRIP, LUCY CREATED A PRESENTATION REPORTING HER SUMMARY ON SPORTS WORLD IN **FREELANCE GRAPHICS**. THIS PRESENTATION WAS ROUTED AS A NOTES DOCUMENT SO OTHER INTERESTED PARTIES IN MARKETING, PRODUCT DEVELOPMENT AND EVEN OTHER SALESPEOPLE ON THE ROAD, LIKE DAVE, CAN QUICKLY ACCESS IT AT THEIR CONVENIENCE.

4 LUCY COMPLETES HER **1-2-3** EXPENSE REPORT FOR THE TRIP, WITH THE ESTIMATED EXPENSES AND THE CASH ADVANCE AMOUNT BEING AUTOMATICALLY ENTERED FROM AMI PRO TO 1-2-3 THROUGH THE NOTES/FX LINK. THE EXPENSE REPORT IS AUTOMATICALLY ROUTED TO HER MANAGER AND THEN TO FRED IN ACCOUNTING.

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Notebook computers

Little relief seen for color backlogs

By Michael Fitzgerald

Just as a flashy new wave of high-performance notebook computers hits the market, vendors are offering a dreary forecast for when supply will match demand for active-matrix color notebooks. Most vendors said they will not reach their goal of meeting demand by the end of the third quarter, which means prices for high-end notebooks will remain high.

The new notebook lines were spurred by Intel Corp.'s new 25-/75-MHz DX4 chip. The low-volt DX4 performs at near-Pentium levels. The ability to add that kind of power without sacrificing battery life prompted a slew of vendors to announce new notebooks.

Toshiba America Information Systems, Inc. and Texas Instruments, Inc., for instance, will ship versions of their current notebooks with the new chips this quarter. The innovative LTE Elite notebook from Compaq Computer Corp. will ship in volume during the second quarter (see story below).

But even the early shippers acknowledged that they will not be able to catch up with demand for thin film transistor (TFT) notebooks in the third quarter. In fact, shortages may persist through 1995, according to vendors.

"This is a real issue for us. Most of our people want color, and most want active-matrix screens," said Glenn Jurmann, section manager of office technology at Baxter HealthCare Corp.

Jurmann said that while Baxter typically has purchased from one main hardware vendor, it is leaning toward buying other brands on a spot basis to get the color screens it needs. Jurmann also said passive-matrix color screens were a possible alternative for many Baxter users, "but we have to sell [end users] on at least looking at it."

Color notebooks hot

The shortages are being fueled by raging demand. BIS Strategic Decisions in Norwell, Mass., predicts that demand for color notebooks will rise 60% this year. William Ablondi, an analyst at the research firm, said demand for active-matrix color products will cause his company to revise its color notebook estimates upward to 33% of the market this year.

Vendors acknowledged that they would have backlogs on all active-matrix color models, particularly those with 9½-in. screens or larger, until late in the year. Vendors refused to specify, but the backlogs, which have been as long as six months in some cases, are expected to be less than two months.

Compaq's LTE Elite notebooks will include both 8½-in. and the scarcer 9½-in. TFT color screens. Jim Hartzog, general manager of Compaq's portable business, said Compaq could have supply issues on high-end notebooks until early 1996.

With the shortages, street prices are expected to remain high: up to $6,500 for a model with a DX4 and a 540M-byte hard drive. Toshiba's T4800CT with a 510M-byte drive will list for as much as $6,800, while TI's WinDX-75 with a 340M-byte hard drive will start at $4,600.

TFT color notebooks have been among

Color demand, *page 41*

Color me backlogged

Prices dropped slightly last year on color notebooks, which remain in short supply, but the sharpest decline occurred in the monochrome segment

	Q1 1993	Q1 1994
486SX 25-MHz monochrome	$2,241	$1,801
486SX passive-matrix color	$2,780	$2,670*
486SX active-matrix color	$3,587	$3,160

*In 1993, the passive-matrix color market shifted to dual-scan, passive-matrix screens

Source: International Data Corp., Framingham, Mass.

Compaq notebook among the Elite

Compaq's new LTE Elite notebook has a nifty feature, a built-in AC adapter that will set it apart from its competitors at least for a time, technologically speaking.

"Most of the notebook makers are just dropping the DX4 into their existing designs, but the built-in adapter is a unique engineering step," said Bruce Stephen, an analyst at International Data Corp. Stephen added that Compaq's decision to replace its 2-year-old LTE Lite "gets them squarely back in the competitive hunt from a feature perspective."

Stephen said the Elite, a replacement for Compaq's LTE Lite, has a number of design features that "shows that they listened to their customers." He cited the addition of PCMCIA slots and a bigger, 9½-in. color screen, as well as a new expansion station.

—Michael Fitzgerald

IBM readies PDA quartet

Plans family of handheld digital products for '94

By Michael Fitzgerald
SOMERS, N.Y.

IBM PC Co. officials say they are confident that enough pieces of the technology puzzle will fall into place to warrant their entry into the personal digital assistant (PDA) market by year's end.

In recent interviews here, Joseph Formichelli, general manager of mobile computing, said the PC Co. plans to deliver at least one product so the market can "touch and feel" it.

Saying that "we want to do a family of products, not a single device," Formichelli outlined a four-point strategy for handheld digital devices:

- A desktop extension machine called a personal information partner, or PIP. It would act as a telephone and a fax machine, recognize handwriting, accept digital images and perform other data-oriented functions. It would probably recognize speech.
- Small, tablet-type devices designed for data entry and review and aimed at vertical applications.
- Voice-oriented devices designed for communications. These will differ from Simon, the advanced cellular phone IBM is building for BellSouth Cellular Corp. Simon combines phone, wireless fax, paging, electronic mail and personal information management functions in one device.
- More OEM products like Simon, if IBM can find customers.

Smart strategy

"That seems like a reasonable strategy," said Dean McCarron, an analyst at Mercury Research in Scottsdale, Ariz. "They'll probably sell the most units of the vertical one, and the 'talk to' one will be what they use for the consumer market. The desktop extension will be the product that dies." McCarron explained

PC Co., *page 40*

Windows 3.11 incompatibility angers IBM

By Ed Scannell

Microsoft Corp. and IBM are continuing to play their tactical game of cat and mouse. In the latest round, Microsoft has released a maintenance upgrade of Windows 3.1 that IBM officials said was deliberately designed to be incompatible with OS/2 for Windows, thereby undercutting OS/2's momentum.

Changes to the USER.EXE and KRNL386.EXE files in the recently shipped Windows 3.11 may prevent OS/2 for Windows from running properly, IBM officials said. They added that they have accurately identified the nature of those revisions and said they can integrate the needed changes and deliver a new version of OS/2 for Windows in the spring.

"The changes they have made are relatively minor. We can do what we need to do in short order and be back to running OS/2 for Windows on anything they ship," said Wally Casey, director of marketing at IBM's Personal Software Products group in Austin, Texas.

Microsoft's changes include new device drivers for Novell, Inc.'s NetWare, fingerprinting software that lets Microsoft better track the piracy of Windows source code and a set of minor bug fixes.

Slower sales sought?

IBM officials claim one of the goals of Windows 3.11 was to break the momentum of OS/2 for Windows by rendering it incompatible. IBM said it shipped about 300,000 copies of OS/2 for Windows from mid-November to Jan. 1 in the U.S. alone; the product has continued shipping at that pace since.

"It is hard for me to believe they would put out a new release in order to add antipiracy things and device drivers that you can get free from bulletin boards. I think they are a little nervous about the acceptance" of OS/2 for Windows, Casey said.

Microsoft denied the charge. A spokesperson said the Windows 3.11 product was under development before Microsoft saw any code in OS/2 for Windows.

Price tag hurts Pentium

By Michael Fitzgerald
and Mitch Betts

Despite the rush by vendors to announce systems based on Intel Corp.'s newest version of Pentium, it seems that Pentium's day has not yet come.

Instead, Intel's new high-end 486, the DX4, will hold sway in the market until Pentium-based systems drop in price, according to users interviewed in recent weeks. Users say they are awaiting a price drop to Intel's proclaimed year-end goal of $2,000.

"$2,000 is the magic window for mass purchases," said Gordon Summers, PC coordinator at ChoiceCare, a health care company in Cincinnati. He said he would not buy Pentium in bulk until it reaches that lower price.

"We have this price/performance threshold of $2,025 and we want to buy the most power we can get for that price," agreed Steven Birgfeld, manager of customer services at Booz, Allen & Hamilton, Inc.'s Corporate Systems and Technology Group in McLean, Va.

Some said Pentium systems are already worth the money. "It's a very cheap investment, considering that the applications are very critical to a hospital's operation," said Wayne Robertson, a former information systems director who recently formed The Robertson Group, an IS consulting firm for hospitals in Fresno, Calif.

Intel's pricing promises have analysts predicting a quicker market turn to Pentium.

"It's a dramatic shift," said Randal Giusto, an analyst at BIS Strategic Decisions in Norwell, Mass. He said Pentium could outsell the I486 in 1995, a year earlier than previously expected. Intel predicts that 25% of the market will buy Pentium systems in the fourth quarter of this year.

Chip announcements

▶ Here is a sample of Intel Pentium 60/90-MHz and DX4 33/100-MHz desktop computer announcements from last week:

- **Advanced Logic Research, Inc.** — DX4 version of ALR Revolution with 8M bytes of RAM and a 420M-byte hard disk, available in May for $3,337; dual Pentium version with 8M bytes of RAM and 420M-byte hard disk, available in May for $4,537.
- **AST Research, Inc.** — Bravo LC 4/100T based on DX4 with 8M bytes of RAM and 540M-byte hard disk, available now for $2,720.
- **Gateway 2000, Inc.** — DX4-based P4D-100 with 8M bytes of memory and a 540M-byte disk drive, available next month for $2,795; Pentium-based P5-90 with 16M bytes of memory and a 540M-byte disk drive, available in April for $3,995.
- **Hewlett-Packard Co.** — VL2 4/100 running DX4, with 8M bytes of memory and a 340M-byte disk drive, available in May for $2,700; Pentium-based Vectra XU 5/90 with 8M bytes of RAM and 420M-byte hard drive, available in May for $4,537.

▶ Notebooks based on 25/75-MHz DX4:

- **Compaq Computer Corp.** — LTE Elite with 510M bytes of disk storage, available in the second quarter for $6,400.
- **Gateway 2000** — Colorbook with 8M bytes of memory and 250M-byte disk drive, available next month for $3,495.
- **NEC Technologies, Inc.** — Versa E with 4M bytes of memory and a 340M-byte disk drive, available now for $5,879.

IBM PC Co.

CONTINUED FROM PAGE 39

that he sees notebook computers, particularly subnotebooks, keeping the wind out of the sails of desktop extensions.

Formichelli cautioned that IBM may not ship PDAs this year because it remains unclear whether the communications and software services needed to make the devices useful will be in place by year's end.

Communications needed

PDAs, PIPs and other handheld devices will probably continue to have little market impact without more stable communications networks such as Cellular Digital Packet Data, better software and communications peripherals.

"It's going to be close. If the market is there, we'll definitely do it," Formichelli said.

PDAs rank third on Formichelli's "to do" list for this year, falling behind meeting demand and bringing out follow-on products to current ThinkPad machines [CW, Feb. 28].

Formichelli promised an update to the high-end ThinkPad line, an aggressive expansion of the lower-priced ThinkPads — which analysts call a major weak point in IBM's portable offering — and an update of the ThinkPad 500 subnotebook.

Scott L. Bower, director of marketing for IBM PC Co. mobile brands, added that IBM's goal is to innovate on the hardware side of things and then bring in third-party innovations in software, service and support for the ThinkPad such as broad-based voice recognition.

ThinkPad rates in popularity

Despite availability issues, those customers who do purchase ThinkPads like them, according to a survey just out from J. D. Power and Associates. The ThinkPad won the first J. D. Power notebook computing satisfaction poll.

After polling approximately 1,200 users culled from the Computer Intelligence database, the researchers found the ThinkPad bested machines from second-place Apple Computer, Inc., third-place Zenith Data Systems and fourth-place Compaq Computer Corp.

ThinkPad scored highest for overall product design and battery life. It fell below average in user support, overall portability and networking.

Christopher Lindquist

Chalk one up for the little guy

Microsoft finally stepped on one ant too many and found a sucker with some teeth. Software vendors small and large are quietly popping a cork in congratulations to Stac Electronics, which won (at least until the appeal) a $130 million award in its data-compression patent infringement suit against those allegedly light-fingered Microsofties.

Users on the the various networks expressed differing degrees of delight, anger and confusion. Some lauded Stac as the mouse that roared, while others compared it to a rather larger rodent. More than a couple were left wondering whether it was time to start stockpiling MS-DOS 6 in the (unlikely) event of an injunction against its sale.

Despite all the noise, at least one CompuServe user seemed to have it in perspective: "Congratulations to Stac Electonics on its victory against Microsoft! At this rate Bill Gates will be broke in 100-200 years."

My kind of town ...

Microsoft seems to be having better luck on the Midwestern front, namely Chicago. The chatter on the 'Net shows that users are pretty pleased with the features and performance, though at least one user made a good point: Why is Microsoft working so hard to get Chicago to run in 4M bytes of memory?

The user said, "It is really disappointing to me to hear that MS is gunning for that low memory area. I know, I know: most people still have only 4M bytes, and many systems still sell with 4M [bytes] standard RAM. I'm just kind of flattened after all the media hype over the last two months, and all we're going to end up with is a slow, sort-of-powerful [operating system]. Hopefully [Microsoft] will release an upgrade or something that requires more hardware for Chicago (there's a request you don't hear every day!) so I can make real use of my 16M [bytes]. We can't be leaning on the people who are just starting to realize what Windows 3.1 is. I think [Microsoft] should move forward. With this thinned-out Chicago, it'll be like two steps forward and one back."

The Wabi lobby

When is Windows not Windows? When it's Wabi, of course. Some Sun customers are complaining that they haven't received their Wabi kits yet. They'll have to wait a bit more, according to Sun tech support. Anyone who sent in a request card before the end of 1993 should have a kit now. The rest will have to wait until as late as April for a revised (and less buggy) version.

Wabi wannabes aren't the only ones waiting. OS/2 peer-to-peer network beta testers have been feeling left up in the air for some time now. If info on the CompuServe PSPBETA forum is correct, they'll be waiting a while longer, too. According to an IBM tech supporter, the beta isn't dead, it's just been in suspended animation for a while and could be for quite a while longer. He said: "My personal view of this is that we have taken longer than we should to keep [peer-to-peer] going toward a release, and before we are done you will probably become even more impatient with us. I won't comment on the reasons for that here. I hope that when the final product comes out that you will all feel it was worth the wait."

I hope so, for his sake.

Oh, and here's something for preparation's sake: If you want to port your OS/2 apps over to the Workplace OS on a PowerPC, the move is supposed to be pretty easy — if you're using nothing but 32-bit API calls. Touching a 16-bit API makes things a bit more hairy.

Your Job's a joke

Sometimes it pays not to take your job too seriously. Anyone interested in taking a break from reading the latest NetWare upgrade documentation might want to be on the lookout for a book called *Humour the Computer* by Andrew Davison, due out from MIT Press later this year. Of course, we've known this was a funny business all along.

It's funny for some of us, at least. Pity the poor guy at Microsoft whose Internet address is billg@microsoft.com. No, it isn't Mr. Bill, just a regular employee with an unfortunate name (or an incredible desire to get lots of useless and sometimes malignant E-mail).

Lindquist is technical editor at *Electronic Entertainment* magazine. He can be reached electronically through CompuServe: 73361,263; MCI Mail: 6117339; Internet: chrisl@netcom.com; or America OnLine at ElecEnt.

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Color backlogs

CONTINUED FROM PAGE 39

the few PC hardware products to maintain relatively stable pricing and little selling off of the list prices. Despite high prices for the high-end notebooks, analysts said there would be demand.

"There is a big market above the $3,000 price point, especially in corporate America," said Bruce Stephen, an analyst at International Data Corp. in Framingham, Mass.

But even some users who are used to paying a lot for notebooks balked at the high-end pricing.

"Those prices are too high — we have a tough sell with [our current vendors] already," said Victor Mutnick, corporate vice president of information systems at New York Life Insurance Co.

New York Life agents now buy mainly NEC Technologies, Inc.'s Versa, which is priced at approximately $4,759 for a 20/40-MHz box with a 250M-byte hard drive. The company also buys IBM ThinkPads when they are available.

High end in deep water

Officials from IBM PC Co., TI and other vendors agreed that the supply of high-end products will be constrained well into the fourth quarter, if not longer.

The PC Co., which may have the biggest backlogs for color active-matrix machines, has taken steps to improve its screen supply by signing a yet-to-be announced deal with an outside supplier, which sources identified as Sharp Corp. [CW, March 7]. Sharp supplies nearly half the world's screens. Sharp will nearly double its TFT active-matrix capacity in the course of the year, and other vendors are also expanding their capacity.

But demand worldwide for active-matrix screens "well exceeds the capability of the industry to supply those screens," said Robert Ritter, vice president of display products at Sharp Electronics Corp.'s microelectronics group in Camas, Wash. Ritter said Sharp does not expect supply constraints to ease until 1995 or pricing pressures to ease much during the rest of 1994.

All vendors stressed that they were shipping more TFT active-matrix color notebooks each quarter but that they could not keep up with demand.

Briefs

TI enables smaller notebooks

Texas Instruments, Inc. released the first details of its Rio Grande integrated processor, a 486-class processor with the Peripheral Component Interconnect bus integrated into it. Rio Grande, a 3.3V chip, will also offer clock-doubling and an integrated PCMCIA controller and will reduce the chip set necessary for notebook functions from five or six chips to three, making for smaller notebooks. It is expected to appear in subnotebooks and high-performance notebook systems later this year.

Duracell has notebook battery

The first fruits of **Duracell, Inc.**'s effort to offer standard off-the-shelf batteries for notebooks appeared last week. The DR19 and DR31 are among the four Duracell rechargeable batteries the company will offer. They are being used in Compaq Computer Corp.'s new Aero subnotebook. The DR19 costs $99 and the DR31 costs $169. Both are intended to be sold through a variety of retail channels.

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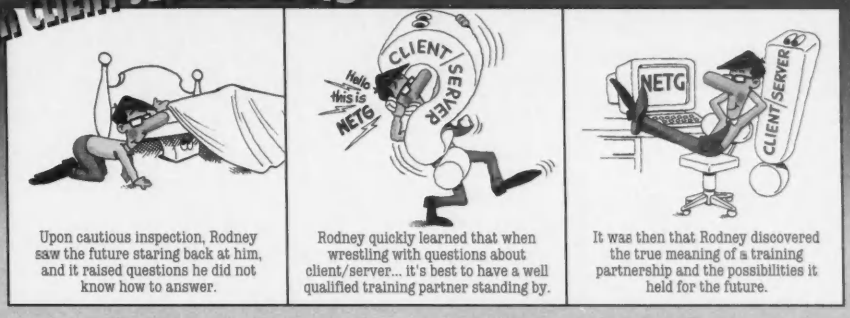

Upon cautious inspection, Rodney saw the future staring back at him, and it raised questions he did not know how to answer.

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If there's one thing we've learned working with our customers, it's that you're running more and more mission-critical applications on your network. And if your network goes down, your business goes down. All of which should give you a better sense of why we built the Compaq ProLiant servers.

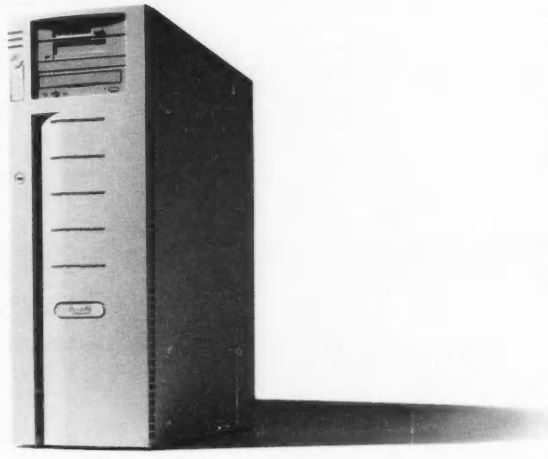
ProLiant is our family of affordable, high-performance and easy-to-manage servers engineered specifically to provide the high availability you need for mission-critical networks. We've designed ProLiant in three different models, ranging from a single-processor configuration to a four-Pentium processor model.

Now, how can you be sure our server is truly a miracle and not a mirage? To begin with, there's Full Spectrum Fault Management, provided by Compaq Insight Manager technology and software that continually monitors over 800 aspects of the server's operating status. (For example, Drive Parameter Tracking checks 15 hard-drive parameters.) All of this information is constantly gathered, analyzed and then used to prevent, tolerate or recover from system problems.

If the performance of a monitored component drops below a specified level, our unique Pre-Failure Warranty kicks in. We'll actually replace a Compaq warranted drive or memory system free. Before it stops working. No downtime. Ringing cash registers. Happy boss.*

Still, no network's perfect. In the unlikely event a problem occurs, our servers exhibit remarkable tolerance. Every ProLiant includes Compaq-designed hot-pluggable drives. ProLiant Models 2000 and 4000 come standard with advanced error-correcting memory and off-line backup processor features (whereby the server reboots automatically to a second processor). And, most notably, the Compaq Smart SCSI Array Controller together with the ProLiant Storage System ensures mission-critical data integrity. Should a network problem bring the server down, the Rapid Recovery Systems of the ProLiant are designed to bring it back up.

VER IS A MAINFRAME WITH AN ATTITUDE.



For example, Automatic Server Recovery 2 uses a historical record of server status and performance to perform an astonishing array of tasks. Like intelligently restarting the server, automatically correcting a variety of problems, and accessing a telephone pager to contact network administrators.

By now you'd expect us to have rethought server setup, configuration and OS installation, but you might be surprised by the results. SmartStart is a CD-ROM system that takes the headache out of getting your server up and running. ProLiant includes a CD-ROM drive and bundled CDs of optimized Netware and other major operating systems. To get hooked up to your network operating system, simply call your dealer for an access code, enter it, answer a few questions, and leave. Minutes later—say, after you've enjoyed a cup of coffee and a jelly donut—you'll return to find an integrated OS fully installed and optimized for increased performance and improved management. And we'll keep you updated via CD when new operating system versions appear.

*And finally, to accompany our new line of mission-critical servers, we're introducing mission-critical support. With ProLiant, we now offer extensive analysis, installation and service through our CompaqCare System Partners, a select group of highly trained systems experts backed by Compaq engineers. You can now choose 4-hour on-site warranty response upgrade** direct from Compaq. Again, there's our unique Pre-Failure Warranty. And, of course, all Compaq servers come with a 3-year on-site† warranty, and 7-day-a-week, 24-hour-a-day technical support.*

All in a surprisingly small box for not a whole lot of money. In fact, a DX2/66 Compaq ProLiant 1000 starts at about $6000‡.

Which may help to explain the look your boss gives you when he hears how much money you've saved: stunned admiration. But you'll get used to that. It goes with the territory. If you'd like to receive model, feature and specification information about our ProLiant servers immediately via fax, all you have to do is call us at 1-800-345-1518, select the PaqFax option and request document #4003. On the other hand, if you'd like a brief technical overview of our servers, we can get that to you even faster. Just turn the page.

COMPAQ

THE COMPAQ PROLIANT MISSION-CRITICAL SERVERS

	ProLiant 1000	ProLiant 2000	ProLiant 4000
HIGH PERFORMANCE NETWORK SERVERS			
Processor	Intel DX2/66 or Pentium 60MHz	Intel DX2/66 or Pentium 66MHz	Intel DX2/66 or Pentium 66MHz
Architecture	Flex or TriFlex/PC One Processor	TriFlex with up to two symmetric processors	TriFlex with up to four symmetric processors
Network Interface	Up to 12 High-Speed Channels; NetFlex 2 with Packet Blaster Technology Standard		
Standard Disk Controller	Integrated Fast SCSI-2 and Smart SCSI Array Controller (selected models)		
Storage Capacity	550MB–112GB Internal/external	1050MB–140GB Internal/external	1050MB–140GB Internal/external
Typical Usage	Departmental network services—primarily NetWare	Departmental network application services—NetWare, NT and Unix	Application services for preemptive downsizing—NT and Unix
Transaction Rating	50–150 TPS	200–300 TPS	300–400 TPS
Estimated Starting Street Price‡	$6,000	$8,900	$13,900
SERVER DEPENDABILITY AND AVAILABILITY			
Management	Second-generation Compaq Insight Manager (standard) combines with innovative hardware design to constantly monitor, assess and report server health and performance		
Fault Prevention	Insight Manager alerts you to server status changes in over 800 component parameters, allowing proactive server management backed by 3-Year Pre-Failure Warranty		
Fault Tolerance	Standard support for RAID levels 1,4,5; hot-pluggable drives; on-line spare drive; off-line backup processor§; advanced ECC RAM§		
Fault Recovery	Standard rapid recovery services automatically return server to full operational status even in the event of a critical subsystem failure		
SIMPLICITY, EASE OF OWNERSHIP AND SUPPORT			
SmartStart	Standard CD-based intelligent hardware configuration and system software installation, providing simplified server configuration for NetWare, NT or Unix. (CD-ROM drive standard)		
System Warranty	Free Three-Year, On-Site Limited Warranty		
Pre-Failure Warranty	Three-Year, On-Site Warranty replacement of designated components that fall below preestablished thresholds		
4-Hour Warranty Response Upgrade	Optional Three-Year On-Site Warranty upgrade to 4-hour response		
Technical Support	Toll-free, 7 x 24 technical phone support from Compaq engineers		
CompaqCare System Partners	Highly trained, dedicated, third-party professionals who provide systems maintenance and comprehensive technical support		
QuickFind/PaqFax	Proactive notification and delivery of new technical information/7 x 24 fax response for updated specification, configuration and settings data		

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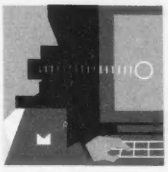
Voice recognition enters the mainstream



By Ellis Booker

Just a few years ago, speech recognition was limited to a number of vertical markets and to those users willing to spend tens of thousands of dollars.

But 1994 is shaping up to be the year of the voice, with Compaq Computer Corp., Apple Computer, Inc., IBM and Microsoft Corp. all offering speech "command and control" and "speech-to-text" systems for the desktop.

Two weeks ago, Dragon Systems, Inc. in Newton, Mass., pushed down the price point for PC-based speech-to-text systems. Version 3.0 of Dragon's DragonDictate product family includes DragonDictate 3.0 Starter Edition, a 5,000-word system that includes both software and a speech board for $695.

"It's a significant price drop," said John Oberteuffer, president of Voice Information Associates, a Lexington, Mass., research firm.

IBM's own 5,000-word, voice-controlled dictation product, VoiceType 2 for DOS, costs $2,195.

Burgeoning market

Dragon's speech recognition engine is an industry leader and is the basis for branded offerings from IBM, Compaq and Microsoft.

According to Ming Lee, director of marketing for privately held Dragon Systems, the market for PC-based dictation has been broadening and now includes the likes of lawyers and doctors.

"These systems used to be for people who couldn't type, and now they're getting into general business use for people who don't like to type," Lee said.

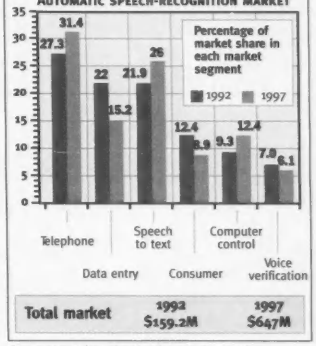
In addition to the starter system, Dragon introduced a 30,000-word and a 60,000-word dictation product. These systems cost $995 and $1,995, respectively.

Dragon's dictation products currently run under MS-DOS on 486-based 33-MHz processors with 12M bytes of RAM and a minimum of 29M bytes of hard disk space.

Dragon also sells TalkTo, a separate product for Windows, but that system supports only voice commands for keyboard and mouse controls. Dragon said it plans a Windows-based dictation system later this year.

Talk to me

The automatic speech-recognition market is expected to grow to at least four times its size by 1997 thanks to powerful algorithms and 386 and 486 PCs



Source: Voice Information Associates, Lexington, Mass.

New Products

Hardware

Epson America, Inc. has introduced ActionNote 500C, an enhanced, passive-matrix, color LCD notebook computer.

According to the Torrance, Calif., company, the product weighs 5.5 pounds.

ActionNote 500C is available in 80M-, 120M- or 180M-byte hard disk drive configurations with one 3½ in. 1.44M-byte floppy disk drive and 4M bytes of RAM expandable to 8M bytes.

Users have the option of including either a 2.4K/9.6K bit/sec. or 14.4K/14.4K bit/sec. data/fax modem.

ActionNote 500C color notebook prices range from $1,999 for the 80M-byte version to $2,199 for the 180M-byte version.

▶ *Epson America*
(310) 782-0770

Software

Triton Technologies, Inc. has announced CoSession for Windows 1.0, remote communications software.

According to the Iselin, N.J., company, CoSession for Windows employs memory management and multitasking features to support enhanced background operations, multiple connections and support for the remote operation of both DOS and Windows programs.

The product uses a compression technology that reduces the amount of data transmitted over telephone lines and decreases the processing time required to compress the data. CoSession for Windows adds a remote access capability that is implemented through disk drive redirection. The drive redirection enables a user to run programs locally and access files from a distant PC or LAN.

CoSession for Windows also offers a driver technology that eliminates the need for special video or mouse drivers to run Windows programs remotely.

A two-PC package costs $199 and includes host and remote software. Additional host and remote packages are available for $129.

▶ *Triton Technologies*
(908) 855-9440

Caere Corp. has introduced OmniPage Professional 5.0, optical character recognition (OCR) software for Windows.

According to the Los Gatos, Calif., company, the product offers advanced three-dimensional OCR technology and complete compound document processing with its True Page technology.

True Page provides a true WYSIWYG formatting option with the ability to capture, display, edit and save the content and format for a complete page in graphics and text applications.

OmniPage Professional 5.0 employs the Caere 3D AnyFont technology, consisting of a Compound Neural System, Caere AnyFax 2.0 technology and a Language Analyst.

OmniPage Professional costs $695.

▶ *Caere*
(408) 395-7000

Capsoft Development Corp. has introduced HotDocs, a software tool that builds intelligent templates from Microsoft Corp.'s Word, WordPerfect Corp.'s WordPerfect and Lotus Development Corp.'s Ami Pro documents.

According to the Provo, Utah, company, the software converts word processing documents into smart templates that reduce the time users spend producing repetitive, routine business documents.

Features include numeric answer range validation, optional formatting, automatic search and replace, block-and-click variable insertion, backward and forward movement, drag-and-drop script building, a drag-and-drop dialog builder utility and repeating variable functionality.

HotDocs is available for $49.

▶ *Capsoft Development Corp.*
(801) 375-6562

Central Point Software, Inc. has announced PC Tools 2.0 for Windows, a product designed to improve Windows reliability, give users greater control over their system and boost Windows performance.

According to the Beaverton, Ore., company, Version 2.0 includes CrashGuard, a system monitor that provides an early warning to avoid Windows crashes; and an enhanced System Consultant that provides self-implementing configuration recommendations.

This version also features support for DoubleSpace drives, enhanced file and desktop management and expanded protection against viruses. The product also offers user-customizable tool bar support for drag-and-drop operations.

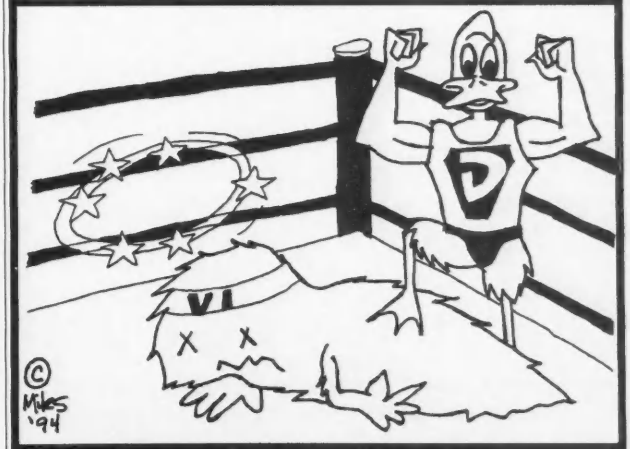
PC Tools 2.0 for Windows costs $180.

▶ *Central Point Software*
(503) 690-8088

Product short

Olympus Image Systems, Inc. has introduced the PagePlex 24 and PagePlex 18 power printers. The PagePlex 24-page-per-minute model provides high-performance network connectivity and features heat fusion electron imaging technology and a RISC-based programmable controller. The PagePlex 24 targets higher-production networked printing environments. The 18-page-per-minute PagePlex 18 offers an assortment of paper-handling features for desktop printing applications in smaller offices and workgroups. Cost: $6,295 for the PagePlex 24 and $3,895 for the PagePlex 18. Olympus Image Systems, Irvine, Calif. (714) 753-5935.

Wrestling the vi monster while migrating from an IBM mainframe to Unix?
Win the fight with help from uni-XEDIT, uni-REXX and uni-SPF.



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When a few engineers at Microsoft set out to write Windows NT,™ they sat down with many cups of coffee, and computers built around the MIPS® R4400™ RISC microprocessor.

(No wonder: the NEC V_R4400™ MIPS processor is at the heart of some of the most powerful computers in the world.)

During the next few years, they worked long and hard, missing quite a few dinners with their families and untold televised sporting events.

Today, Windows NT makes it possible for companies to run their enterprise software on a whole new class of dependable, affordable machines. Like the NEC Express RISCserver,™ direct descendant of the machines used to write NT itself. And it gives software developers, designers and engineers access to remarkable new tools like the NEC Image™ RISCstation.™

In short, a few engineers sat down. And the entire computing world leaped.

The only Windows NT-specific systems in the industry: NEC MIPS RISC Systems

- **Express RISCserver**
- **Image RISCstation**

for the new generation of 32-bit client server and database applications.

- *NEC V_R4400™ MIPS RISC processors with MultiRISC™ architecture supporting dual processor SMP operation*
- *MultiRISC system management for hardware problem detection and reporting (standard on RISCserver)*
- *Fully optimized multithreading among four hardware subsystems: I/O processor, video and memory*
- *Up to 128MB RAM on the system board, additional memory expansion up to 512MB (ECC coding) using industry standard SIMMs*
- *MultiSpin™ 3X CD-ROM standard on all NEC RISC systems**
- *Hard drive options up to 2 GB*
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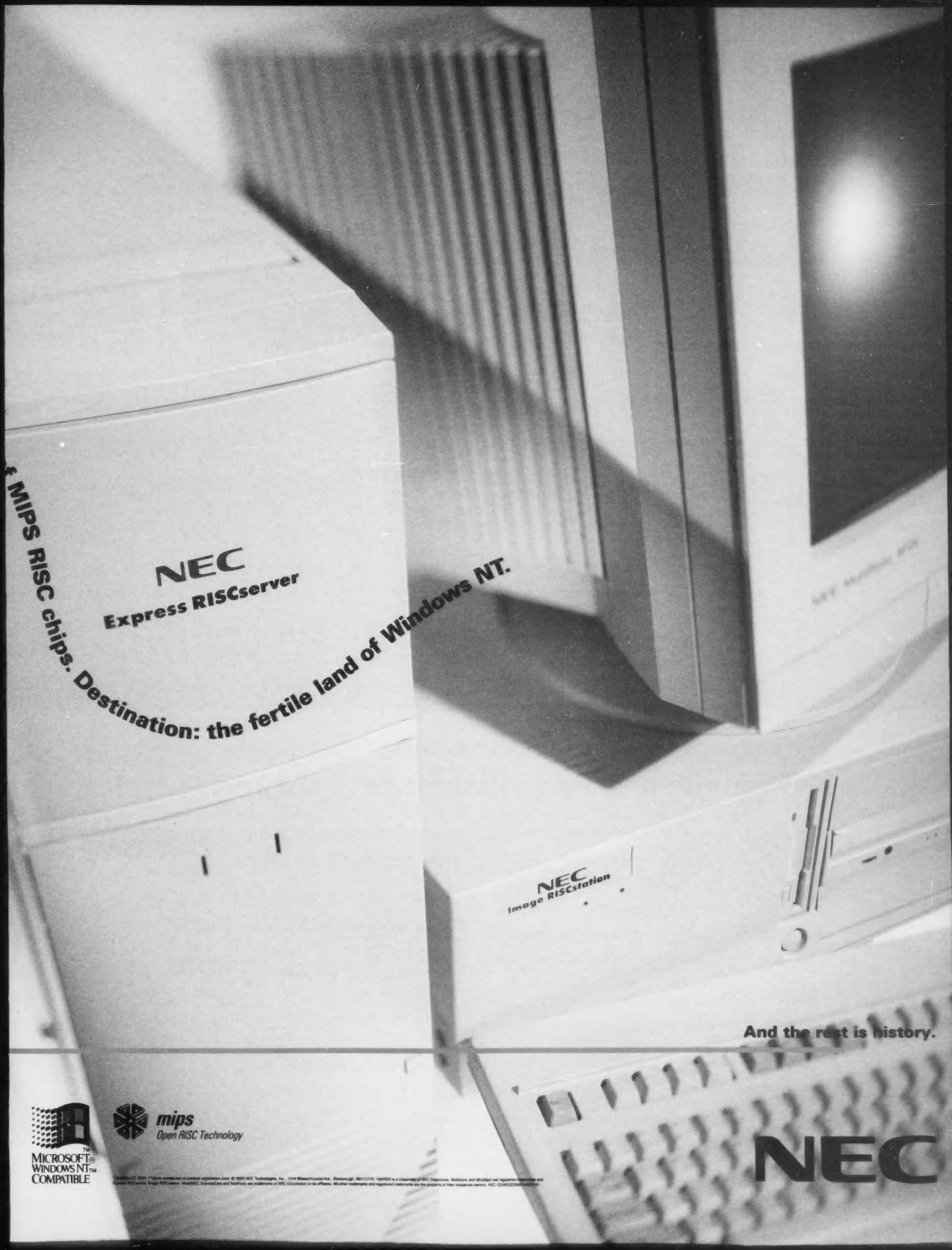
- *3 year limited Express-Care™ warranty** Express-Care upgrade options available*

A river of coffee. A raft made

For more information, call 1-800-NEC-INFO or for details, or fax, call NEC Fastfacts™ at 1-800-366-0476, #4647472 Image RISCstation #9777472 Express RISCserver


MIPS RISC chips. Destination: the fertile land of Windows NT.
NEC
Express RISCserver
NEC
Image RISCstation
And the rest is history.
MICROSOFT®
WINDOWS NT™
COMPATIBLE
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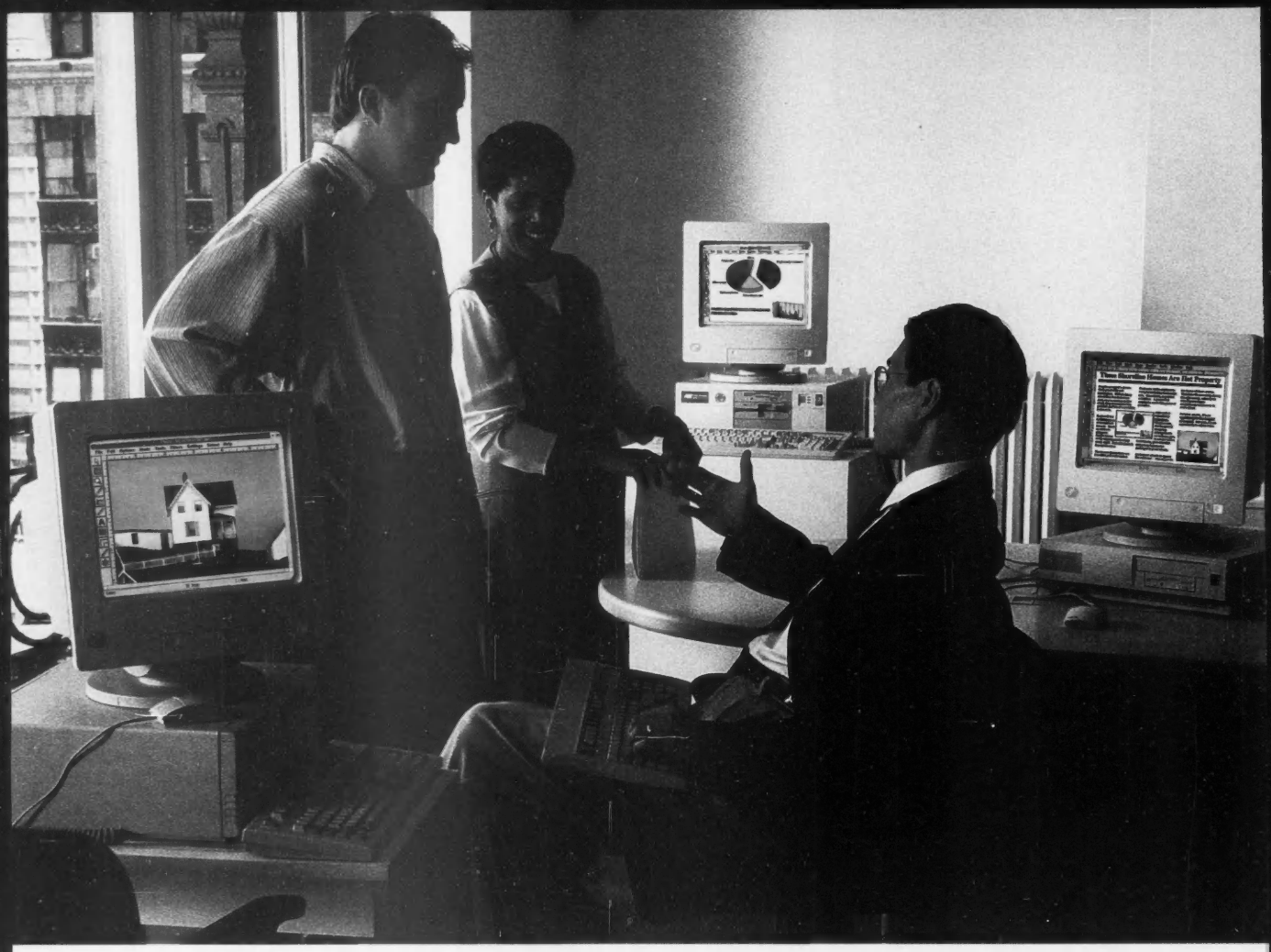


Give people a better view, and the reviews will take care of themselves.

Words can't really describe the sharp, flicker-free images you'll see with IBM's new high-res, non-interlaced monitors. But until you actually see these newest displays of technological leadership with your own eyes, read what the reviewers have had to say.

BYTE
January, 1994

"The 17P was the clear winner for image quality in its class."

COMPUTER SHOPPER
November, 1993

"The IBM 15P...ranking among the best 15-inch monitors for ease of operation, color control, video mode support...."

"The IBM 17P will turn heads for its bright colors and crisp text...the price is right, too."

PC Computing
December, 1993

"[The 21P]...delivers an unwavering image...yielding excellent brightness, a tight focus and solid colors."

PC MAGAZINE
December 7, 1993

To learn more about IBM's monitors, and how they can make any PC look better, ask your authorized IBM dealer or call 1 800 772-2227. If you'd like to order, simply call 1 800 426-7370.*

IBM®

The 15P, 17P and 21P have actual diagonal viewable areas of 13.7", 15.3" and 19.0", respectively.

*8am–10pm M–F, 9am–5pm Sat, EST. IBM is a registered trademark of the International Business Machines Corporation. © 1994 IBM Corp.

Microsoft ventures into repository realm

By Stuart J. Johnston and Ed Scannell

While observers say they will try to keep an open mind about Microsoft Corp.'s upcoming Application Structure Database (ASD), they are skeptical about the need for a latter day version of IBM's Repository Manager.

Experienced analysts note that one of the failings of repositories is that by nature they are complex and take a long time to build. During those long development cycles, the applications and tools they are supposed to support often surpass them in sophistication.

"It took so long to build something like [the Repository Manager] that by the time it arrived, the industry had changed to the point where it no longer had much practical use," said Rich Finkelstein, president of Performance Computing, Inc., a consultancy in Chicago.

Still, Finkelstein and other analysts said they see some advantages to Microsoft's approach because the technologies will be modular and will trickle out over time. ASD will not be nearly as all encompassing as the Repository Manager in what it supports.

Among the benefits of a central repository is the ability to reuse objects rather than create new ones to solve similar problems, Microsoft officials said. A repository also can simplify development and maintenance of both the objects themselves and the much larger, complex applications that comprise the objects.

"You can think of them as collections of objects that you can use for vertical applications, such as banking and finance," said one source familiar with the project.

With the repository as a central focus, other products, including computer-aided software engineering tools and program design methodology products, will be able to interface with it.

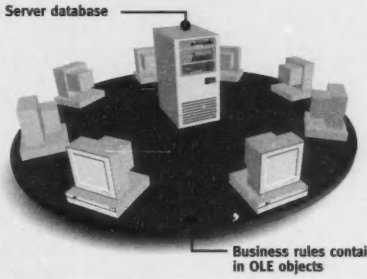
Viewed in a more abstract fashion, Microsoft's ASD repository is the center of the firm's long-term strategy and leaves access points for a range of tool types.

These access points will provide interfaces for tools that can be used to build the complex applications needed for networks of low-cost PCs to replace mainframe applications, according to Microsoft's strategy.

Included in this litany is support for program design techniques such as structured programming tools and other design methodologies, although Microsoft likely will not offer such tools itself, said David Vaskevitch, Microsoft's director of enterprise computing.

Microsoft view

By isolating the business processes — such as how a company processes a credit authorization — from the client and server components, Microsoft seeks to simplify development and maintenance of enterprise applications



Source: *Client/Server Strategies*, IDG Books, Framingham, Mass.

Other plans

The company will be a major player in some of the other areas, however, including distributed database technologies and application construction tools such as programming languages and program objects.

With Microsoft's Office, for example, all of the company's major productivity applications now expose their internal code objects to external macro languages.

The company is also set to announce this month its Object Linking and Embed-

Repository, *page 50*

Software AG unveils advanced SQL tool

By Gary H. Anthes
DALLAS

■ Software AG of North America gave users a sneak preview of an advanced SQL query and presentation tool at a recent symposium here.

To be announced next month and ship in the second quarter, the product uses expert systems technology to allow nontechnical users to generate complex and error-free SQL commands, Software AG said.

Dozens of desktop-based tools generate SQL queries. However, according to the Reston, Va., software vendor, most of them cannot handle complex database structures and reporting requirements. Even worse, Software AG said, existing tools let users construct queries that produce meaningless or incorrect answers.

Most SQL products require some knowledge of database design, Software AG said. For example, when generating a request for order information in a typical system, the user would need to know that order header and order detail data are kept in separate tables and that the product, customer and salesperson tables must also be accessed to produce a complete order picture.

Using a digital "query assistant" in the new product, end users can build and execute complex queries with a few clicks of a mouse, while expert rules block the construction of logically inconsistent results, the company showed in a demonstration.

Thomas A. Steinman, a senior programmer at Marathon Oil Co. in Findlay, Ohio, called the demonstration "very exciting." He said end users in business units at the oil com-

Software AG, *page 50*

Lotus takes on new Approach

Version 3.0 will reportedly work as front end to Notes package

By Lynda Radosevich

Lotus Development Corp. last week said it showed European customers a prebeta version of its Approach 3.0 desktop database for Windows, said to work as an adjunct to Notes and to address performance and interface issues in the current release of Approach.

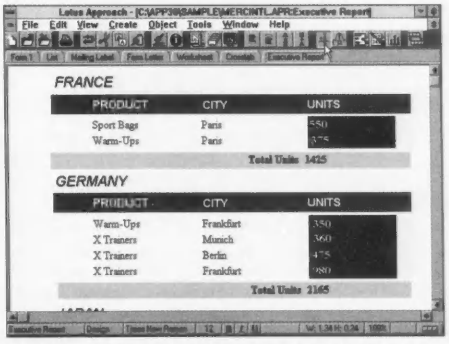
Approach 3.0 can access information in Notes forms via "live links" using Notes Field Exchange. That means an Approach user can work directly with Notes data, and changes made in one program are reflected in the other.

From there, users can sort the data, create reports, chart it and generally use it in a fashion they cannot in Notes, according to a Lotus spokesman.

"Notes is a good repository, but you still need something to slice and dice the information," said Perry Haynsworth, a vice president at Notes site Fleet Bank in Boston. Although he has not yet seen it, Approach 3.0 could answer that need, he said.

While Notes has some reporting capabilities, the difference is that Approach is able to run "two pass" reports, whereby users can manipulate the extracted information several times, according to Approach marketing director Jaleh Bisharat.

The Notes support also means that Approach forms can be used to enter information into Notes databases, thereby addressing users' complaints that the Notes interface is not ideal for data input.



With Notes and Approach *on the desktop, users could access sales information in one field in a Notes database, run calculations based on other fields (sales in France) and format the design*

The new version has similar links to 1-2-3 Release 4, the company's Windows-based spreadsheet, Haynsworth said.

Also, Approach 3.0 links to SQL databases, so users could join Notes and SQL database information using Approach as a front end.

Notes customers have complained about the difficulty of linking the different data forms [CW, Aug. 16, 1993].

Lotus will ship Approach 3.0 to initial beta sites at the end of March and is expected to ship commercial code before July, according to the spokesman.

Solbourne, Oracle bundle helps first-time client/server users

By Kim S. Nash

Solbourne Computer, Inc.'s bundling of its symmetric multiprocessing (SMP) hardware with Oracle Corp. financial applications may not always save users money over buying the products separately, but the deal turns technical support into a one-call proposition.

Aimed at first-time client/server users, Solbourne's Smart Bundle is essentially a turnkey setup designed to ease the transition of accounting tasks off mainframes and onto Unix systems (see chart). A big lure for users is the promise of simpler technical help despite the fact that Smart Bundle is a combination of products from different vendors.

"Knowing you have just one company to call — Solbourne — to get problems solved is soothing," said Steve Wade, director of information technology at Fairchild Space and Defense, Inc. The Germantown, Md.-based contractor does not yet use Smart Bundle, having bought Solbourne's SMP hardware and Oracle's accounts payable package separately last year.

However, Fairchild will likely buy Smart Bundle to eliminate one potential pitfall — messy, multivendor support — as it downsizes mainframe accounting systems to Unix-based Solbourne boxes, Wade said. Accounts receivable is next on his list.

Oracle's 29% hold on the client/server applications market persuaded Solbourne to put its eggs in the database maker's basket. Oracle accounted for about $75 million of 1993's $263 million in sales of client/server packages, according to International Data Corp. in Framingham, Mass.

First, Solbourne will target the 40% of its 700 hardware users who already use Oracle's relational database, said Carl Herman, Solbourne's president and chief executive officer.

The bundling agreement does not preclude Solbourne from selling applications from vendors other than Oracle, but "our intention is to focus on Oracle," Herman said.

Further, Herman said he does not expect competition with Oracle to be an issue. The firms go after different user segments, he said, with Oracle aiming for very high-end Fortune 500 users. Solbourne targets users with annual sales of $100 million to $500 million.

"The market we're going after couldn't afford Oracle consulting" — implementation help that Oracle frequently adds on to the applications or databases it sells, he explained.

Solbourne claims to have optimized its hardware for Oracle databases and financial packages to wring high performance from the combination. Still, some users may prefer to buy accounting software elsewhere because Oracle packages lack features such as imaging and document management, said Ken Shirley, director of information systems at Fleming, Hovencamp and Grayson, a Houston law firm.

Conversely, the capacity and speed of Oracle applications is too much for the 50-employee legal firm, Shirley said.

To get the right fit and functionality, Fleming, Hovencamp bought financial modules from Great Plains Software. The law firm generates a lot of documents and data, warranting the power of a Solbourne SMP machine. But with just three users to do accounting, "Oracle apps would be overkill," Shirley explained.

Add it up

Solbourne's Smart Bundle is essentially a turnkey system for users who want a jump-start in client/server accounting applications

- Solbourne multiprocessing server with a modified Sun Solaris operating system
- \+ Oracle financials
- \+ Oracle database
- \+ Solbourne performance monitoring tools
- \+ Help with installation and training
- \+ One year of support

$300,000-$800,000

Software AG

CONTINUED FROM PAGE 49

pany are encouraged to code their own ad hoc reports using Software AG's Natural fourth-generation language (4GL). The SQL tool would free them from the need to understand programing languages and syntax, he said.

Steinman said the software's apparent ability to block flawed queries was attractive. "It is a problem," he said. "If a client doesn't know what he is doing, he can get bad information."

"It could appeal to our end users who don't have experience with Natural," said Joan Vragel, database administrator at Rochester Gas & Electric Corp. in New York. "We will probably bring it in-house to check out." She said it could empower users to access data instead of having to ask information systems for help.

At the user conference, Software AG announced the availability of Entire Access, an adjunct to its Natural 4GL that lets Natural users access popular relational database management systems using a single, unified set of SQL commands. It enables applications to work transparently with multiple RDBMSs by translating standard SQL statements into the SQL dialect appropriate for the target database.

Vragel said Rochester Gas & Electric is evaluating Entire Access as a way to help its IS staff — trained in Natural on a mainframe — retrieve information from Sybase, Inc. databases on Unix-based IBM RS/6000 servers.

Straddling act

In the second quarter Software AG will begin shipping Entire Broker, middleware that sits between pieces of an application located on different computers. It acts as a client/server communication agent and supports connectionless or connection-oriented communications. It also supports a "conversational" mode in which multiple clients share a single conversation with a server or multiple servers provide the same service on a first-available basis.

Software AG discussed in general terms a Natural-based visual programming tool, to be available in the third quarter, that will be portable across applications on the desktop and LAN server. Unlike conventional development tools, it will be "event-driven," meaning the resulting graphical user interfaces will drive the application by invoking chunks of application code as needed on the desktop or server.

Problem solver

Business problem: Unreliable SQL tools that return false information.
Software AG solution: SQL tool for end users driven by expert rules — due in second quarter.

Business problem: Limited scalability of visual programming tools.
Software AG solution: Visual programming tool for enterprisewide systems — due in third quarter.

Business problem: Limited access to all databases in large IS shops.
Software AG solution: Entire Access — available now.

Business problem: Lack of infrastructure for second-generation client/server systems.
Software AG solution: Natural RPC and Entire Broker — due in second quarter.

Repository

CONTINUED FROM PAGE 49

ding (OLE) control objects, OCXs, which let Microsoft and third parties offer prepackaged mini applications that can be used inside other applications or in stand-alone fashion.

This way, users will be able to mix and match which functions they combine to build their own customized applications.

Getting larger

Even before OCXs debut, however, at least one third-party developer is already rolling out a componentized, object-oriented application that requires a larger OLE-enabled host application.

Seattle-based Shapeware will ship this month its Visio Express for Microsoft Office, a $79 add-in that provides business drawing tools. The tools work with the latest versions of Word, Excel and PowerPoint.

Although the product is purchased separately, it is installed on the host application's tool bar and appears as just another function of the host application, a Shapeware spokesman said.

Microsoft recently released the Office 4.0 applications suite, which exposes its internal objects to outside macro languages and is OLE 2.0-enabled. It is destined to be the chief host for these new component objects.

OCXs and other OLE component objects, like Shapeware's new product, are key to Microsoft's overall strategy and represent the middle of the company's newly proposed three-tiered client/server model.

"The first thing the MIS people ask is, 'Where's Cobol?' " Vaskevitch said. "In [the two-tiered] model, there's no place for business rules."

Current client/server models only allow for a two-tiered model, which requires that either the client or server — or both — contain code defining the business processes. This makes development and maintenance more difficult to support.

With the three-tiered model, "you can rev the user interface and not have to touch those business rules. But right now, it's hard to separate those out," said Jesse Berst, editorial director at "Windows Watcher," an industry newsletter in Redmond, Wash.

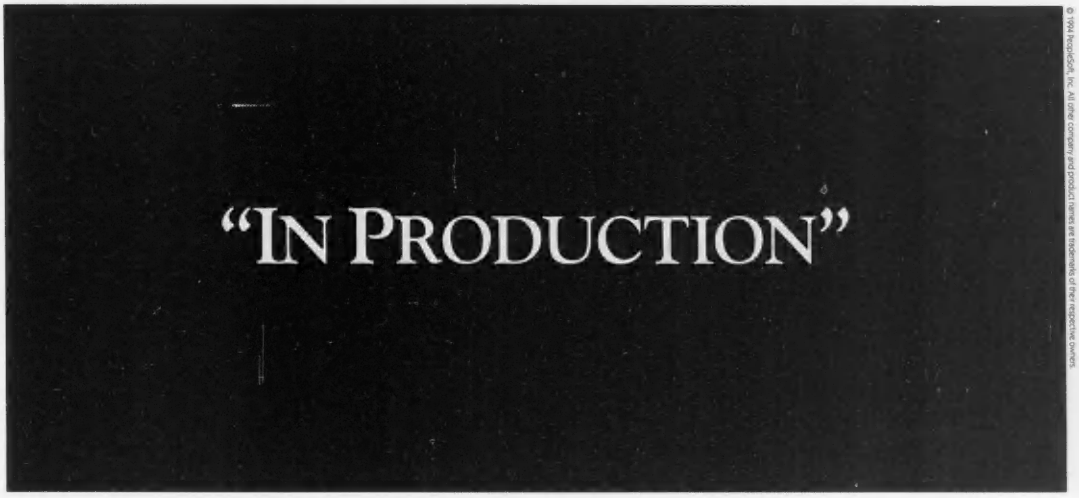
"This is Microsoft rewriting the rules again. No one out there has articulated clearly what client/server should be, and Microsoft is taking the opportunity to redefine things on its own," said Frank Dzubeck, president of Communications Network Architects, Inc. in Washington.

Going vertical

The company began more than two years ago to insert itself into several lucrative vertical markets via its consulting group and extensions it is adding to the Windows programming interface to suit various industries. These industries include retail, finance services, accounting, health care, legal, pharmaceuticals, manufacturing and sales force automation, said Dwayne Walker, Microsoft's director of solutions channel marketing.

Although Microsoft claims its strategy leaves plenty of room for third parties to cash in, much of the company's plans are less than altruistic. Having gobbled up more than half of the approximately $10-billion-per-year PC software market, it is now eyeing what it sees as a $50 billion large-scale market as well.

PeopleSoft would like to suggest 2 key words to look for in evaluating client/server financial applications:



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New Products

DataTools, Inc. has announced that SQL-BackTrack for Sybase, its relational database utility product, will support Sun Microsystems, Inc.'s Solaris and Hewlett-Packard Co.'s HP 9000 HP/UX platforms.

According to the Menlo Park, Calif., company, SQL-BackTrack has physical and logical format backups, media tracking, remote backups and simplified recovery.

The product costs $4,595.

▶ *DataTools*
(415) 617-9100

Starlight Networks, Inc. has introduced Version 1.7 of its StarWorks digital video networking software, which supports up to 40 simultaneous DOS, Windows and Macintosh users accessing video and audio across Ethernet, Token Ring or Fiber Distributed Data Interface networks.

According to the Mountain View, Calif., company, StarWorks offers increased storage capacity for video and audio files; a parity option for easier hard disk recovery; and network management and maintenance features designed to control congestion on the network, track problems and make repairs.

StarWorks-50M (50M bit/sec., 40-user support) costs $24,995; StarWorks-25M costs $14,995; and StarWorks-12M costs $8,750.

▶ *Starlight Networks*
(415) 967-2774

Insignia Solutions, Inc. has introduced SoftWindows, which lets Sun Microsystems, Inc.'s SunOS users run virtually any Windows or MS-DOS application or utility at up to 486SX PC performance levels on higher-end SPARC workstations.

According to the Mountain View, Calif., company, SoftWindows provides compatibility with a variety of PC devices and systems, such as COM ports, memory systems, video displays, floppy drives, networks and PC CD-ROM drives.

A SoftWindows license costs $549. License extensions are available for $429.

▶ *Insignia Solutions*
(415) 694-7600

Visual Engineering, Inc. has announced Ovation, PC and Macintosh-like presentation graphics software for Unix.

According to the San Jose, Calif., company, Ovation's features include drag-and-drop graphics from other Unix applications, hyperlinks to trigger Unix multimedia features and integration with Unix databases. The product also offers multidisplay presentations, graphic arts features such as translucency and graphical on-line help.

Ovation costs $795 per user.

▶ *Visual Engineering*
(408) 452-0600

Opera Systems, Inc. has announced the MSS-128D Mass Storage Server, a fully integrated robotic tape library that provides networkwide data access for storing and managing up to 1T byte of data.

According to the Danvers, Mass., company, the MSS-128D system incorporates 4mm digital audio tape technology and provides low-cost, near-on-line storage for network data-intensive applications including backup/restore and image and multimedia storage.

The cost is $55,000 for a base system to maximum configuration of approximately $110,000.

▶ *Opera Systems*
(508) 750-4700

XL/Datacomp, Inc. has introduced two high-performance 9637 Disk Subsystem models that feature SCSI host interfaces and either 1G- or 2G-byte head disk assemblies (HDA).

According to the Lisle, Ill., company, the 9637 has a total capacity of 6.8G bytes when configured with 1G-byte HDAs. When configured with 2G-byte HDAs, the 9637 has a total capacity of 13.8G bytes. The 1G-byte HDAs have a mean time between failure (MTBF) of 300,000 hours, and the 2G-byte HDAs offer a MTFB of 500,000 hours.

Prices range from $37,400 to $56,100.

▶ *XL/Datacomp*
(708) 434-1200

Product shorts

Thursby Software Systems, Inc. has announced Version 3.0 of TSSnet for The Santa Cruz Operation's (SCO) Unix and Open Desktop operating systems. TSSnet offers a cost-effective way to network SCO-based systems with Digital Equipment Corp. systems without installing new software or hardware on existing networks. Features include a file transfer utility that provides complete bidirectional single- or multiple-file manipulation between remote and local nodes on a network and a gateway that lets Open Desktop users run DECwindows clients on remote VAX/VMS systems. Cost: $1,995. Thursby Software Systems, Arlington, Texas (817) 478-5070.... **Zitel Corp.** has announced that CASD, a product that integrates disk drives with the company's write/read cache management system, will use a 4G-byte drive. The additional disk capacity enables the CASD 4000 to deliver high performance to Digital Equipment Corp.'s VAX and Alpha systems, along with Hewlett-Packard Co., Sun Microsystems, Inc., Unisys Corp. and Unix users, at a lower cost per I/O or cost per transaction. Cost: $15,800 for a CASD 4000 with 16M bytes of cache memory. Zitel, Fremont, Calif. (510) 440-9600.... **Simplify Development Corp.** has announced Version 1.1 of Mailroom for Windows, an office application designed to simplify the processing and communications of documents. Mailroom and its companion product, ShareScan, convert paper documents to electronic images that can be transmitted over LANs and wide-area networks. Cost: $179 for Mailroom Personal Edition. A 10-user pack of Mailroom for Windows costs $995. ShareScan is available for $495 per network scan server. Simplify Development, Nashua, N.H. (603) 881-4450.

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23. Dir./Mgr. Sys. Development, Sys. Architecture
31. Programming Management, Software Developers
41. Engineering, Scientific, R&D, Tech. Mgt.
60. Sys. Integrators/VARs/Consulting Mgt.

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70. Medical, Legal, Accounting Mgt.

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90. Other Titled Personnel

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(a) Solaris (e) Mac OS
(b) Netware (f) Windows NT
(c) OS/2 (g) Windows
(d) Unix (h) NeXTstep
App. Development Products ❑ Yes ❑ No
Networking Products ❑ Yes ❑ No

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60. Government - State/Federal/Local
65. Communications Systems/Public Utilities/ Transportation
70. Mining/Construction/Petroleum/Refining/Agric.
80. Manufacturer of Computers, Computer-Related Systems or Peripherals
85. Systems Integrators, VARs, Computer Service Bureaus, Software Planning & Consulting Services
90. Computer/Peripheral Dealer/Dist./ Retailer
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23. Dir./Mgr. Sys. Development, Sys. Architecture
31. Programming Management, Software Developers
41. Engineering, Scientific, R&D, Tech. Mgt.
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51. Sales & Mktg. Management
70. Medical, Legal, Accounting Mgt.

OTHER PROFESSIONAL MANAGEMENT
80. Educator, Journalists, Librarians, Students
90. Other Titled Personnel

3. Do you use, evaluate, specify, recommend, purchase: (Circle all that apply)

Operating Systems
(a) Solaris (e) Mac OS
(b) Netware (f) Windows NT
(c) OS/2 (g) Windows
(d) Unix (h) NeXTstep
App. Development Products ❑ Yes ❑ No
Networking Products ❑ Yes ❑ No

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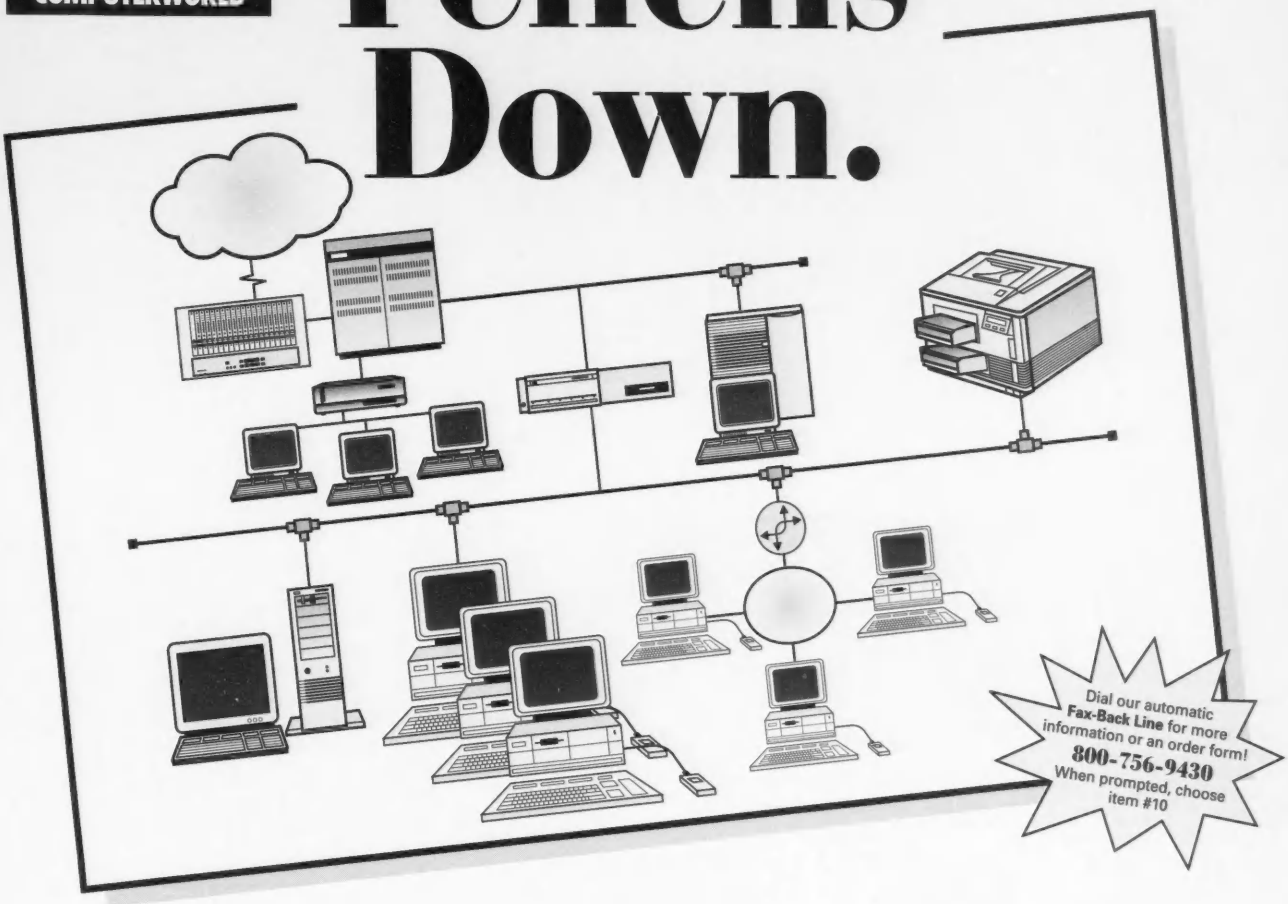

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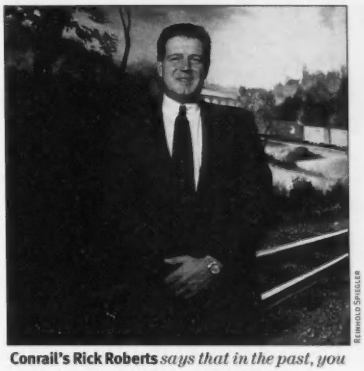
Conrail makes pen-based connection

By Thomas Hoffman
PHILADELPHIA

It may lack the historical luster of Promontory Point — the legendary Utah landmark where the U.S. Atlantic and Pacific coasts were united by rail in 1869 — but Consolidated Rail Corp.'s pen-based data communications links between its mobile crews and its customer service center in Pittsburgh represent a "gold spike" in Conrail's networking annals.

Until recently, the $3.45 billion rail freight carrier could not route critical customer information to its locomotive crews once they left the rail yards on a run. But since July 1992, Conrail has outfitted 236 locomotives with pen-based computers linked via radio to the National Customer Service Center (NCSC). It plans to equip an additional 417 locomotives by the end of next year.



REINHOLD SPIEGLER

Conrail's Rick Roberts *says that in the past, you contacted a train by waving it down*

No more phones

The network, called the 1580 Work Order System, is named for the enumeration on Conrail's work order forms. In the past, customers would phone in shipment orders to the NCSC, which would key them into an IBM 3090 mainframe system and then fax them over to a rail yard before a train's departure. Once the crews left the rail yard on a run, NCSC had no way to communicate last-minute changes to them, according to Rick R. Roberts, Conrail's director of transportation/customer service.

"When the crews left, we couldn't give them work orders over the radio since the airwaves were congested and only used for emergencies," Roberts said of the Conrail-maintained Motorola, Inc. radio network. In fact, as recently as two years ago, the only plausible way to contact a train conductor or brakeman was to stand on the tracks and wave him down, Roberts added.

Transportation analysts said the communications rift left Conrail at a disadvantage to its mobile, computer-savvy competitors in the trucking industry. "Because of the length of the haul in the Northeast and Midwest, railroads require the speed and reliability of just-in-time service," noted Graeme Anne Lidgerwood, a senior transportation analyst at CS First Boston Corp. in New York.

Fighting back

However, key information technology investments in recent years by Conrail and peers such as Union Pacific Railroad have enabled the rail industry to do "a lot of serious blocking and tackling" against its trucking competitors, Lidgerwood added.

According to Conrail executives, the up-front costs to install their work order system were relatively small. Conrail spent $3.1 million on Grid Systems Corp. Gridpad computers and front-end software developed by Cone Software in Boothwyn, Pa. Some $2.3 million has been budgeted to equip the additional 417 locomotives with mobile computers and software. And Conrail has spent $400,000 to internally develop mainframe software to crunch the orders on the IBM 3090 at its data center, placing the total investment at $5.8 million before monthly communications costs.

However, the new pen-based work order system was not designed to save the carrier money but to help Conrail be more responsive to cus-

Conrail, *page 61*

ON SITE

Consolidated Rail Corp.
Philadelphia

Mission: To replace manual work orders with real-time, radio-based pen computing apps to electronically link conductors and brakemen with Conrail's NCSC in Pittsburgh.

Technology: Grid Systems' Gridpad pen computers, Cone front-end pen software, Ericsson/GE radio modems, RAM Mobile radio network, Digital Equipment Corp. VAX 6200 and IBM 3090 mainframe.

Benefits: Reduced work order transport times from 12 hours to minutes; increased customer service satisfaction; increased turns on rail cars.

REINHOLD SPIEGLER

Conrail's Richard Semerad: *The new pen-based work order system will help Conrail be more responsive to the customer*

Messaging to bridge great ID divide

Specification would add information about attached files to E-mail

By Lynda Radosevich

■ Users can expect to see a major messaging annoyance cleared up within the next year. Messaging and desktop application vendors plan to implement a technology that allows different electronic-mail messages operating across X.400 backbones to automatically identify information about attached files.

This capability is critical to information systems shops that have, for example, different kinds of word processing packages because among other things, it will allow translation to take place that is transparent to end users.

Vendors agreed on technical details in January and will begin testing this month a common way to implement Body Part 15. Body Part 15 is the dubious sounding piece of the 1988 and 1992 X.400 messaging standard that recommends that a message contain certain information about attached objects.

ID please

A major goal of Body Part 15 is to shield users (and applications) from the complexities involved in:

- **Identifying the type of file and version number**
- **Detaching the file from the E-mail message**
- **Performing any necessary conversion or reformats**
- **Importing the data into the recipient's own application**

Source: Electronic Mail Association, Arlington, Va.

If successful, the specification will allow, for instance, a Lotus Development Corp. CC:Mail user to send an attached Microsoft Corp. Word file across a public X.400 network to a recipient. Using Body Part 15 information, that recipient's WordPerfect Corp. system would know how to invoke Word or query the recipient about changing the file format.

Exxon Corp. is one user company that is encouraging the move. "We see a definite benefit in being able to receive attached body parts that could be automatically recognized by the receiving mail system," said James McDermott, a senior telecommunications specialist at Exxon Computing Services Co. in Houston. "Today when you get an attachment, you really don't know what it is, and it's kind of confusing for the user to try to figure it out."

Although that capability is sometimes available to users who send mail across X.400 systems to users of the same E-mail software, the file identification process breaks down when messages are passed between different packages.

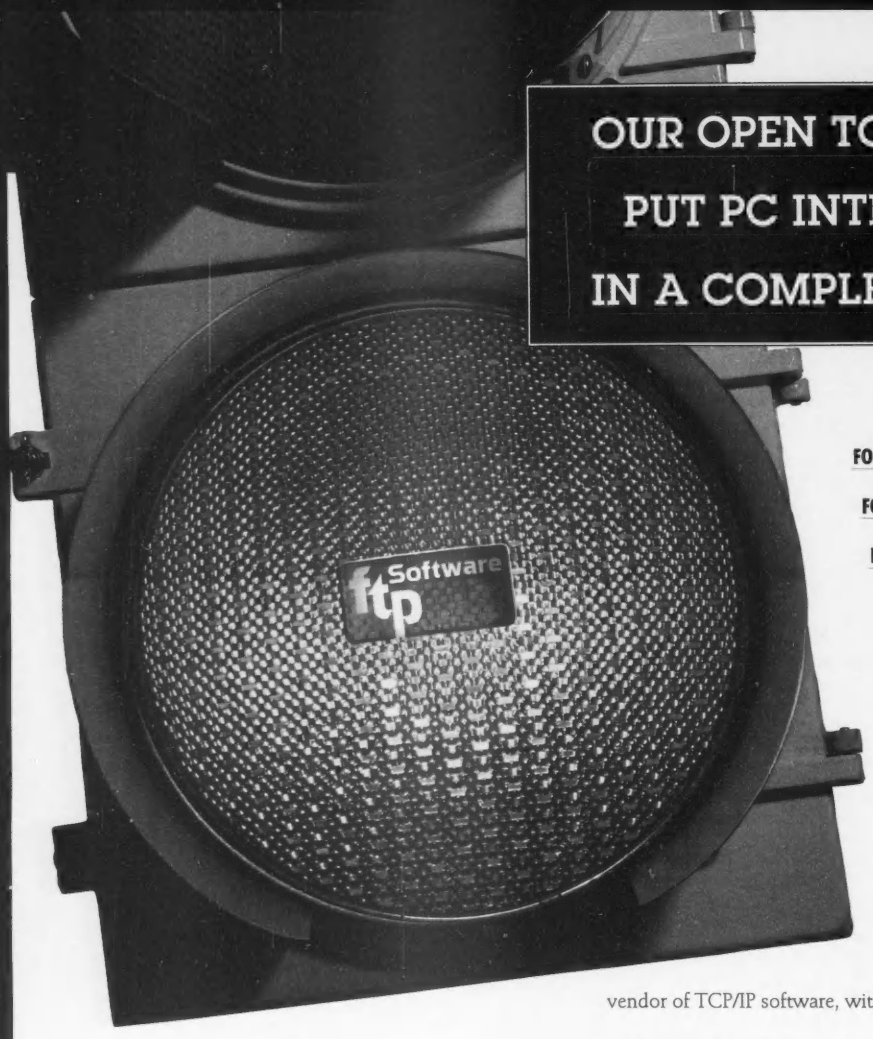
"If somebody created an Excel document, and I see an attachment that comes through and it says DBH3GX.TXT ... I have no idea what application I need to launch to look at the thing," said Bill Brown, an associate at Perot Systems Corp. in Dallas. Perot is a systems integrator for clients such as Nationsbank Corp. and Volkswagen of America, Inc.

"In an environment where there are relatively few applications creating attachments, it's not too bad. But in an environment where there are a lot ... then it's a real nightmare," Brown said. The problem mainly lies in a vendor's X.400 gateways, he added.

For example, users must remember to identify the parent application somewhere in the message, or the recipient must guess which applications to try first. In turn, that annoyance creates a roadblock to wider messaging usage, according to IS managers.

In January, vendor members of an Electronic Messaging Association (EMA) working group agreed on a common Body Part 15 technical solution for iden-

Messaging, *page 63*



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National Semi reaps NetWare benefits

By Elisabeth Horwitt

National Semiconductor Corp. has recognized both the dangers and the rewards of implementing an early version of Novell, Inc.'s NetWare 4.x enterprise network server.

But the risks have been more than offset by the potential benefits of putting crucial data and applications in the grasp of marketing, sales and support field personnel, according to Steve Knightenson, principal network analyst and field sales organization project manager at the chip manufacturer.

The fundamental advantage of the system, now about five months into its implementation, is that field operatives can now transparently access resources on their home server from a laptop, anywhere in the country.

"The enterprise nature of [NetWare 4.01] provides me [with] a nice, home-based operation remotely, no matter where I go," said Tom Riedl, area director at National Semiconductor's East Coast sales division.

"You take the scenario of a support person dealing with a customer who says, 'I have this problem'; the salesperson can dial into the server and access databases throughout the organization to determine 1) if the problem is unique; 2) if the solution is already out there; and 3) the status of the customer's order in the workstream" to pinpoint exactly when it will arrive, Knightenson said.

This is in contrast with the industry norm, which is to tell a customer, "It'll be there in two or three weeks," he added.

The system also links sales and support people to the customer service center in Arlington, Texas, where they can access the latest information about a customer. The system makes the same data available and shareable among a 300-person staff of field application engineers, system engineers and salespeople "who need to support customers' needs and answer questions rapidly," Knightenson said.

In addition, a fax server installed on each LAN allows the salesperson to request, via laptop, that data sheets on a particular product be sent directly and immediately to the customer. Previously, such a request took a couple of days to fill.

What makes all this possible is NetWare Directory Service, a global directory that resides on NetWare 4.01 servers and automatically connects an authenticated user with the requested NetWare service or server, anywhere in the enterprise. Frame-relay links among all the field offices ensure fast response time even when a cross-country detour is necessary.

National Semiconductor also chose to implement NetWare/IP, Novell's recently shipped product that enables clients to access NetWare services using TCP/IP. This is because the company has standardized on TCP/IP as its corporate transport protocol, as well as for IBM host access, Riedl said. Indeed, the firm is eliminating its NetWare for SAA, which provides SNA links to the hosts, and will instead use TCP/IP on the mainframe.

The combination of NetWare 4.01, TCP/IP and mobile laptop users has presented National Semiconductor with some unusual challenges, that few, if any, Novell users have faced, Knightenson said. For example, his group had to figure out how to enable users, who had identifications for logging on to servers in one TCP/IP subnetwork, to log on to resources in other subnetworks.

The company rejected the idea of having users change their own addresses as too error-prone. The eventual solution was to install Shiva Corp.'s LAN Rover E dial-in server at each field office LAN and assign each user to one port on each LAN Rover. The LAN Rover takes the incoming TCP/IP address from a visiting user and maps it to an address that allows access to NetWare resources on the LAN.

National Semiconductor evaluated Novell's NetWare Connect remote access software but rejected it primarily because, unlike Shiva's product, it does not support Apple Computer, Inc.'s Apple Remote Protocol; a few of the laptops are Macintosh-based.

National Semiconductor's Steve Knightenson: *Data now accessible to staffers who support customers*

National Semiconductor also ran into the problem of users reconfiguring their portables by adding software or changing the interface, "providing something they bought that changes the WIN.INI file we've painfully set up," Knightenson said. The usual result of this is that the user's portable messes up at some critical juncture, and when the user reports the problem, he neglects to mention that it has been reconfigured. "So you have the hot line trying all kinds of things and running into walls," Knightenson said.

The solution: locking the systems down via software and ensuring a consistent image and configuration throughout the corporation. Users can vote to add something, going by majority rules.

National Semiconductor looked at other platforms before it settled on NetWare. Unix "is a strong, robust environment, but it takes a lot of [people] horsepower," Knightenson said. Microsoft Corp.'s Windows NT "is still evolving; I don't want to bet the farm on it right now."

ON SITE

National Semiconductor Corp.
Santa Clara, Calif.

Goal: To provide mobile sales, marketing and support personnel with access to key corporate data.

Challenges: To maintain ID-based access as users move; ensure consistent laptop configurations; and coordinate application and configuration updates.

Technology: NetWare 4.01, Compaq Computer Corp. ProLiant 1000 servers; Sybase, Inc. database server on IBM RS/6000; Novell LAN Workplace for DOS and NetWare/IP; FTP Software, Inc. TCP/IP software; Saber LAN Systems' LAN Workstation 2.0 Windows front end; Shiva's LAN Rover E dial-in server; Zenith Data Systems' Znote 325 laptops; 486-based laptops now being evaluated.

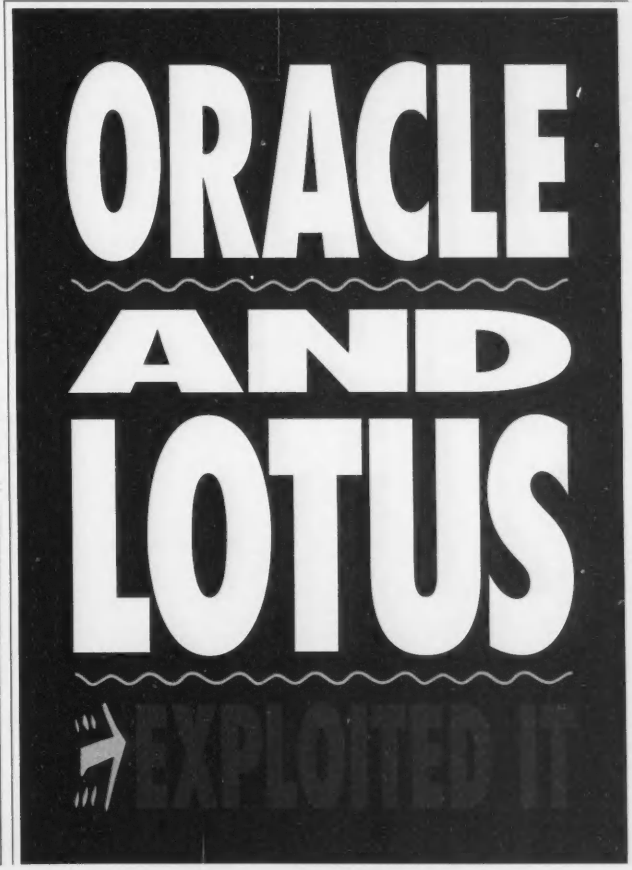
Briefs

X.400, wireless mail merge

A partnership announced recently between **Motorola, Inc.**'s Advanced Radiodata Research Center and messaging vendor **OSIware** in Vancouver, British Columbia, should give mobile users wireless access to public data networks by year's end. The companies are attempting to join wireless technologies and add support for Microsoft Corp.'s Messaging Application Programming Interface (MAPI) to enable service suppliers to switch traffic between wireless and public services and make it easier for MAPI developers to build support for those services into their products.

GTE, IBM offer voice system

GTE Telecommunication Services and IBM's Networking Software division said they will provide a network management system that will let wireless carriers monitor and control their voice and data communications systems from one source. The system will combine IBM's NetView/6000 and GTE's SmartAlert analysis system.



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1. "The CW Guide to Servers," Computerworld, March 22, 1993 and "The CW Guide to Servers and Supercomputers," Computerworld, January 17, 1994.
2. International Data Corporation, "Data General's Ascent in the UNIX Market," October, 1993
3. "Clash of the Ultra Arrays," PC Week, October 11, 1993

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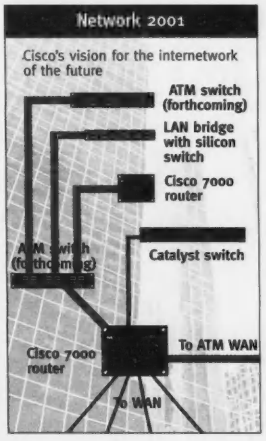
Cisco: Bringing virtual networks to reality

By Stephen P. Klett Jr.

■Cisco's recently unveiled internetworking strategy focuses on perhaps the two hottest networking topics today — Ethernet switching and virtual networking. While the benefits of each are well-known, the plausibility of virtual LANs remains a question for users.

Virtual networking is the ability to logically move individual users among workgroups on a LAN without requiring physical changes to the desktop, cabling or software. For example, a network administrator can move individual user nodes in one subnet by "cutting" them from a schematic on a central workstation and "pasting" them into another subnet.



For the short term, Cisco's strategy combines router-based virtual networking over a copper or Fiber Distributed Data Interface (FDDI) backbone with Ethernet switching. For the long term, Cisco is providing a migration path to internetworks based on Asynchronous Transfer Mode (ATM) technology (see chart). For example, it is shipping an ATM router interface now and developing with NEC Corp. an ATM switch slated to ship this summer [CW, March 7].

As a core element of Cisco's strategy, the company has essentially pulled switching out of its 7000 router family and implemented it in a silicon switch processor, which Cisco plans to integrate in future products such as an intelligent LAN bridge. The 7000 will then be positioned on the periphery of the network, acting as a gateway between wide-area networks or as a fire wall between LANs.

In this respect, analysts said, Cisco's routing philosophy is similar to 3Com Corp.'s Boundary Routing architecture, which 3Com now complements with high-speed switching technology acquired from Synernetics, Inc.

Doubting users

Some users, while intrigued by the concept of virtual networking, said they had doubts about its feasibility.

"It sounds like a nice feature that I'd really like to see because it could result in significant savings for us, but I don't believe what they are stating can be done, particularly across the wide area," said a telecommunications manager at an East Coast research laboratory who requested anonymity.

Analysts said this was a popular perception among users and represents a major hurdle for networking vendors to clear. However, they said Cisco may be best positioned to implement virtual networking and move it from dream to reality.

"People have been talking about virtual networking for a while but they didn't have the clout of a Cisco, which should go far in helping to educate the market," said Charles Robbins, an analyst at Aberdeen Group in Boston.

Still, observers said Cisco's plan to offer router-based virtual LAN capabilities is unique.

"Up to now, most people have been talking about virtual networking through ATM or a new switching hub. This is the first router-based virtual networking I've seen," said Kathryn Korostoff, president of Sage Network Research, Inc. in Natick, Mass.

By integrating this function in routers, observers said, Cisco has the potential to provide more robust capabilities — such as wide-area virtual networking — than its hub counterparts.

For some users, wide-area virtual networking holds a lot of promise.

"The concept of virtual networking is very intriguing to us — especially over the wide area," said Sam Picture, manager of telecommunications at Home Savings of America in Irwindale, Calif., which uses Cisco and Cabletron equipment at its headquarters and at more than 360 branches. "The ability to construct and manage virtual workgroups over both the local and wide area could help us cut out a lot of expensive trips to our wiring closets and possibly a lot of trips to our smaller branches as well."

A matter of packaging

All of the joint development, acquisitions and road maps announced in the networking market of late are making it difficult for users to choose a strategy of their own [CW, March 7].

"All the vendors that used to fit in neat little categories no longer do, which is confusing to users," said Kathryn Korostoff, president of market research firm Sage Network Research, Inc. in Natick, Mass.

Korostoff and other observers said the question is now one of packaging — who offers the most robust, reliable feature set at the best price.

There is a lot of room for improvement in the latter category, users said, and they are holding off on making decisions until progress is made.

"I don't believe that vendors are getting the message the world has changed," said Sam Picture, manager of telecommunications at Home Savings of America in Irwindale, Calif. Five years ago, technology was the driving force behind information systems purchases, where today price is the driver, he said. "Vendors don't appear to realize this and want me to pay for their [research and development] — for capabilities I may not even need — which I refuse to do."

— Stephen P. Klett Jr.

Products around the corner

Cisco announced the following products as part of its internetworking road map:

- **The forthcoming ATM switch** will support up to 16 155M bit/sec. ATM ports and comply with the ATM Forum UNI Version 3.0 signaling standard, which will eliminate the need for a separate management unit. It will support both permanent and virtual switched circuits and will have four priority levels and separate queuing classes for data- and time-intensive traffic.
- **The ATM interface processor** will allow any Cisco 7000 router to communicate with the ATM devices. It will be available in May for $20,000.
- **A scaled-down 7000 router and an Ethernet-to-FDDI workgroup switch** will ship this month. The five-slot 7010 router will have the functionality of the 7000 series but in a smaller chasis. It will support up to 18 LAN or 24 WAN interfaces. Prices start at $11,900.
- **A silicon switch processor** will more than double the performance of the 7000 family from 110,000 packet/sec. to 250,000 packet/sec. All 7000 routers can be upgraded with the processor for $7,500. It will ship in May.

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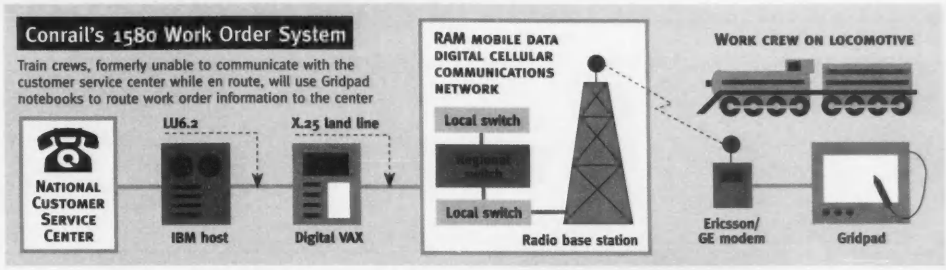
Conrail

CONTINUED FROM PAGE 55

tomers and retain more of them, according to Richard E. Semerad, director of Conrail's customer service operations.

If, for example, General Motors Corp. needed Conrail to pick up two freight cars of headlight assemblies at its Tarrytown, N.Y., plant and deliver them to Detroit, a locomotive crew headed in that direction could be notified over the RAM Mobil Data radio network, receive the order on its Gridpad computer and confirm the order with the NCSC within minutes.



Speed wins

At least one of Conrail's customers said he has benefitted from the new system. "We've already witnessed quicker response time in getting our cars in and out of the plant," said Jim Embrick, a distribution group leader at Air Products & Chemicals, Inc. in Paulsboro, N.J.

Although some computer-illiterate Conrail crewmen were reluctant to use the pen-based systems, the company's simplified eight-hour training sessions appear to have been effective.

"I like this system because completing the work is a lot faster than the 1580 paper-based system," said Ray Murray, a Conrail conductor based at the Philadelphia rail yard. "Besides, no one has to worry about reading my handwriting," Murray added.

To date, Conrail's radio network costs are $22,000 per month, which covers the use of the pen-based systems from its Albany, N.Y., Philadelphia and Harrisburg, Pa., divisions. However, those costs are expected to increase dramatically as the carrier adds other geographic divisions, such as Indianapolis and Dearborn, Mich., and future applications to the network, such as rail inventories and locomotive speed restrictions at different points on each run, according to Jerry T. Conway, a Conrail systems manager.

REINHOLD SPIEGLER

Systems manager Jerry Conway *says costs will rise as geographic divisions are added to the network*

Because Conrail dominates the Northeast freight industry and its operations are limited to that area, radio-based networked communications for its pen-based systems probably make more sense than more costly cellular networks, said Bill Lempesis, president of Lempesis Research, a Pleasanton, Calif., market research firm that specializes in mobile computing. Cellular networks are deployed across 95% of the U.S., while RAM Mobile Data's network covers only 40% of the country, Lempesis said. "But if you're running a lot on the East Coast, I'm sure the RAM coverage is sufficient," he added.

Stan Schatt

ATM realities

The salesperson was clearly frazzled. Looking over his shoulder to make sure no one was eavesdropping, he opened his raincoat to reveal several network interface cards. "IBM's low-speed ATM cards," he whispered. "These are going to be very *hot*."

Hundreds of business plans are being generated right now on the premise that Asynchronous Transfer Mode (ATM) will be *the* dominant network topology very shortly. Yet many of these plans are based much more on anecdotal evidence and wishful thinking than on hard facts.

If I had $100 for every report generated in the past year on the impact of multimedia on ATM sales, I could pay cash for a new Jaguar. Despite the industry press hype, do you have any idea how few Fortune 1,000 companies are planning to add multimedia applications to their LANs over the next year? Information gathered from more than 150,000 interviews indicates that fewer than 100 sites will add multimedia LAN applications.

Recently I surveyed network managers at large sites in the process of migrating mission-critical applications to their LANs. These applications ranged from customer databases to industry-specific imaging and multimedia programs. These network warriors are on the bleeding edge trying to balance their desire for network interoperability with reliability. Their jobs depend on keeping their networks trouble-free.

This network-savvy group was interested in ATM long-range but was looking for immediate solutions that offered complete interoperability with legacy LANs running Ethernet, Token Ring, etc. The vast majority was leaning toward switched Ethernet and Token Ring, as well as 100M bit/sec. Ethernet and Token Ring. About 10% planned on the Fiber Distributed Data Interface (FDDI).

Fewer than 400 ATM switches were sold in 1993. This number will grow considerably in the next few years, but there are some constraints that must be kept in mind. Many of the large corporations that purchase ATM as a backbone solution will be looking toward seamless LAN to wide-area network connectivity.

Don't count on it yet

Despite what you might hear from vendors, don't plan for widespread ATM on the WAN with LAN interoperability before 1998. Look for intelligent hubs with ATM switching functionality, such as those offered by SynOptics and Cabletron, to become popular with the Fortune 1,000. ATM on the desktop will depend on how quickly adapter prices can drop below $700, as well as how quickly new bandwidth-intensive applications such as multimedia appear and strike a responsive chord.

There is no question in my mind that ATM will become a dominant network backbone topology during the next few years, but it will co-exist with 100M bit/sec. networks and switched versions of both Ethernet and Token Ring, as well as copper and fiber versions of FDDI. Network managers will mix and match these topologies based on traffic patterns and individual user needs.

So the next time someone offers you a single, inexpensive solution to handle your high-bandwidth network traffic, don't take out your checkbook.

Schatt is LAN service director at Computer Intelligence/InfoCorp in La Jolla, Calif.

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High-tech execs laud information highway

By Gary H. Anthes
WASHINGTON

Increased business efficiency is the most important reason for building the government-sponsored National Information Infrastructure (NII), according to 400 high-technology companies responding to an American Electronics Association (AEA) survey of its members.

Boosting competitiveness and aiding research were ranked second and third.

Asked to assess the importance of the NII to 16 broad industry segments, survey respondents named education as the biggest winner, followed closely by media/publishing and banking/finance. More than half said the NII would enable them to be more responsive to customers.

What is it?

The NII is a concept promoted by Vice President Al Gore for a broadband, interactive multimedia network and applications for business, education and consumers. Although many AEA members will contribute to the building of the NII, they were surveyed as potential users of it, said Claiborne Johnson, corporate vice president at Electronic Data Systems Corp. and a member of the AEA task force that sponsored the poll.

"I read a number of the surveys," Johnson said. "I don't think that very many people — if any — were answering it from a selfish perspective. Most of the questions are along the lines of, 'How are you going to use it in your business?' not 'How are you going to sell to it?' "

Respondents said electronic mail and electronic databases were the most useful NII applications for their companies. More than a third said it would help their employees telecommute.

About three quarters of the executives surveyed cited government regulations and a lack of standards as two obstacles to creation of the NII. Slightly more than half said cost was a barrier.

Mail gateway upgrade due

Computer Mail Services, Inc. said it will take over development of an upgraded Microsoft Corp. Mail to MCI Global Messaging Service gateway software package for translating and routing messages between the two systems.

The Southfield, Mich., company, which develops MCI gateways for Lotus Development Corp., Banyan Systems, Inc. and Novell, Inc. messaging systems, said it will ship a new Microsoft Mail gateway by March 31. The gateway will update Microsoft's current Mail to MCI gateway, which the company will no longer support or develop, said Jon Goodman, a Microsoft product marketing manager.

The gateway will reside on a Microsoft Mail router and will connect at intervals with MCI Global Messaging Services to forward mail and faxes. The major additional features include chargeback codes that validate message use for attorneys and other professionals who charge back their services. It also has a feature that lets administrators preclude certain end users from using the MCI gateway.

Additionally, users can access the gateway directly from the Microsoft Mail address list, according to Computer Mail President Lih-Tah Wong. The gateway will ship for $495 for 10 users or $890 for a "post office" version.

—Lynda Radosevich

Messaging

CONTINUED FROM PAGE 55

tifying attached messaging objects. The vendors included Microsoft, Lotus, WordPerfect, OSIware, Isocor, Hewlett-Packard Co., Digital Equipment Corp., SoftSwitch, Inc., AT&T Easylink, MCI Communications Corp. and General Electric Information Services, according to Neil Koorland, working group member and development leader for enterprise connectivity at Microsoft.

Some of the vendors will begin testing the message attachment technology on March 31, and the remaining vendors are likely to complete testing during the next six to 12 months. Details have not been finalized.

Products using the object identifier should also roll out in the same time frame, according to Koorland.

Isocor, Digital and OSIware are expected to be the first vendors to participate in the feasibility test, according to one source.

Before Body Part 15 can benefit users, application vendors must register a unique object identifier for each attachment type with authorized entities such as the American National Standards Institute. For Lotus, WordPerfect and Microsoft, that project is already under way, Koorland said.

The EMA has agreed to publish the identifiers, he said.

The Multipurpose Internet Mail Extensions (MIME) define similar capabilities for Simple Mail Transfer Protocol messaging systems such as the Internet.

Once Body Part 15 is in use, it should not be difficult to enable it to work with MIME and allow Internet and X.400 users to exchange identified attached objects, according to a member of the EMA working group.

New Products

Satori Automation, Inc. has announced ScriptMate 1.0, a product that automates micro-to-mainframe tasks, including routine mainframe maintenance jobs.

According to the Roswell, Ga., company, ScriptMate is fully compatible with most 3270 terminal emulation software. It can schedule unlimited jobs and features cross-platform interoperability and improved gateway performance. ScriptMate can run a script written for one emulator on one operating system and transfer the script to another vendor's emulator on a different operating system without making changes.

Single user prices start at $295, and a five-user network license costs $995.

▶ *Satori Automation*
(404) 640-0904

Enterprise Software Corp. has introduced Net/Overview, a product that helps manage networks to service-level commitments, simplifies recovery from complete or partial failures and provides full automation facilities.

According to the Marina del Rey, Calif., company, Net/Overview offers visibility over the entire backbone network and diagnoses network difficulties at three levels: physical component, user session and the application itself.

The product automatically determines and maintains the state of the Token Ring (backbone and boundary), complete SNA network, Ethernet (TCP/IP) and X.25 network connections.

Requirements include IBM's NetView, MVS and VTAM.

Prices range from $30,000 to $80,000.

▶ *Enterprise Software*
(310) 305-7721

Racore Computer Products, Inc. has introduced a PCMCIA adapter that connects notebook and laptop PC users to their corporate or branch office Token Ring networks.

According to the Los Gatos, Calif., company, the Racore Token-Ring Gold Card offers plug-and-play compatibility with all computers that are compliant with the PCMCIA Release 2.0 standard.

The Token-Ring Gold Card is inserted into any Type II or Type III slot, and the appropriate driver is selected for a LAN environment.

Support for shielded twisted-pair and unshielded twisted-pair Token Ring cabling types is provided. The PCMCIA adapter design uses Texas Instruments, Inc.'s Token Ring chip set for high throughput at 4M/16M bit/sec. speeds.

The Token-Ring Gold Card costs $485.

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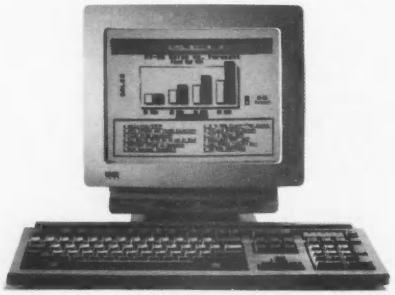

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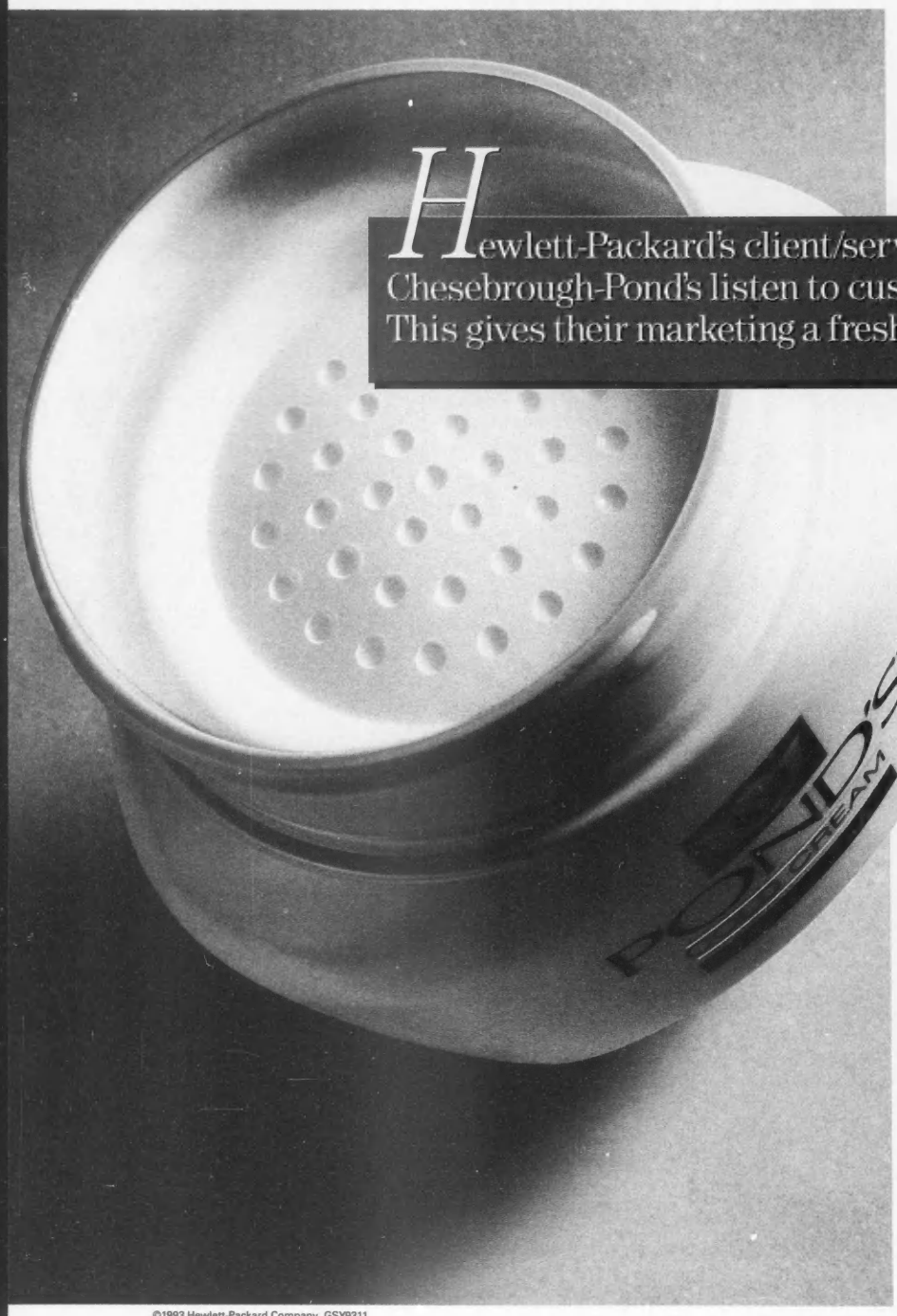

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Price battle set for host storage

IBM addresses EMC's rapid rise as RAID vendor

By Craig Stedman

■ The success of EMC Corp.'s Symmetrix mainframe storage subsystem has sounded a wake-up call at IBM, which is now telling industry analysts it plans to target EMC with more aggressive marketing. That is likely to mean better storage prices for large systems shops.

Some users are already witnessing IBM's new aggressiveness in action. "I'm seeing IBM doing things that I don't ever recollect them doing before," said Tod Dixon, vice president of information resources at Northeast Utilities, an electric company in Hartford, Conn.

Northeast Utilities is in the final stages of choosing a vendor for the purchase of more than 100G bytes of mainframe disk and tape storage, according to Dixon. The company is considering IBM, EMC and Storage Technology Corp., and IBM has been "very aggressive" on pricing, he said.

"A lot of times [in the past], IBM had trouble understanding the difference between their fixed price and the market price," Dixon said. "They've made great inroads there. Now they seem to be out there saying that they're not going to lose business."

IBM is also taking a more liberal view of "all the little sweeteners that they throw in to make price less important," Dixon noted. Included in the pitch to Northeast Utilities were "substantial extensions" on storage warranties beyond the standard period of one year, he said.

Not everyone is convinced, however. Stan Johnson, director of MIS for Worldport LA, the Los Angeles port authority, agreed that IBM appears to be trying to "finally wake up" and make itself more competitive. "But they just don't know how to come out here and market like the other guys," he said.

While other vendors such as EMC make do with one salesperson, IBM still sends a team of salespeople to meet with him, Johnson noted. "I'm not sure they've learned the lesson yet that it doesn't take five IBMers to change a lightbulb," he said. "And the people that pay for it are us."

An IBM spokesperson said executives at its Storage Systems division "have been stating very strongly that we intend to be price-competitive" with EMC and other vendors. IBM also expects to be able to point to product advantages once it ships new cache features announced two weeks ago and redundant arrays of inexpensive disks (RAID) that are under development, the spokesperson added.

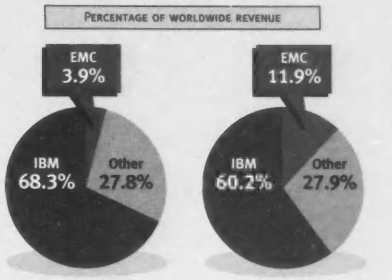
Nick Allen, an analyst at Gartner Group, Inc. in Stamford, Conn., said price competition should get even better from the customer's standpoint once IBM delivers its RAID products. Those devices were due out in the second quarter but have been delayed until September.

"Right now IBM's strategy is to hold the market and tell customers to wait, which is what they have to do given their position" with the RAID boxes still not ready for shipment, Allen said. "1995 is likely to be pretty bloody on pricing."

IBM is being pushed by the market share gains EMC has made at its expense over the past two years, analysts said. EMC in Hopkinton, Mass., tripled its mainframe direct-access storage device (DASD) market share last year, according to International Data Corp. (IDC) estimates (see chart). EMC has shipped about 3,000 of its high-performance Symmetrix subsystems with RAID Level 1 disk mirroring since late 1990.

Rise and fall

Much of the mainframe DASD market share that IBM lost during 1993 went to fast-growing EMC



Source: International Data Corp., Framingham, Mass.

In the big leagues

"Two years ago, IBM viewed EMC as a minor annoyance," said Robert Callery, an analyst at IDC. "But EMC just took the ball and ran with it, and IBM kind of got left in the dust a little bit."

"IBM was letting EMC walk away with the market without putting up much of a fight," said Mike Casey, an analyst at Computer Intelligence/InfoCorp in Santa Clara, Calif. "IBM needs to respond with products; they also need a more aggressive marketing and sales appproach."

Doug Underhill, a technical specialist at CSX Transportation, Inc., a railway transport company in Jacksonville, Fla., noted that EMC broke the typical mainframe DASD mold under which IBM was the technology leader and plug-compatible vendors followed its cue.

CSX expects to replace some of its mainframe DASDs this summer as leases run out on installed devices and will look at both IBM and EMC, Underhill said. "My inclination is to believe that IBM will be more aggressive than they would be if there were just the traditional competitors," he added.

See related stories in the **CW Guide to RAID**, page 91.

Commentary

Jean S. Bozman

Keeping the house in order

Housekeeping, housekeeping, housekeeping. The very word sounds dull, laborious and slightly obsessive. But as users move from the safety of the "glass house" data center — renowned for its housekeeping of data files, job scheduling and off-site storage — they must apply the same housekeeping skills to routines of the distributed network.

Dull or not, housekeeping paid off for IS managers caught in the Los Angeles earthquake. Those who carefully stored operating system tapes and duplicates of applications and data files off-site were the unsung heroes of disaster recovery. It may have taken hours, or even days, but those computer networks got back in business, even if they were moved to other sites.

Some IS shops in Los Angeles, including ITT Gilfillan, an ITT Corp. radar equipment subsidiary in Van Nuys, Calif., have even made a point of locating PC servers in the data center [CW, Jan. 24]. That simple IS technique ensured that backup routines were followed regardless of whether end users remembered to do them in their workgroups. And PC users, long proud of their independence from the glass house, were served well because they were back in business shortly after the quake.

Jockeying for position

The Unix world must also take stock of its housekeeping, even if no quake is in sight. The single greatest barrier to Unix computing in mainframe shops today is concern about the reliability of data stored in distributed Unix servers. Some large corporations are extending Unix pilot projects until systems management software catches up with distributed computing. Meanwhile, others rely on modules built into the Oracle and Sybase database management systems to assure data integrity in large Unix systems.

Quite literally, a race is on to see which vendors can bridge the systems management gap with Unix applications that mimic the housekeeping routines of the IBM mainframe data center. Leading contenders to clean up in Unix systems management are Computer Associates in Islandia, N.Y., OpenVision in Pleasanton, Calif., and Tivoli Systems in Austin, Texas. But many small firms are fielding systems management software, too.

The phenomenon is well understood by Sun Microsystems, which has begun to sell its large-scale SPARCcenter 2000 servers to host new applications at IBM mainframe sites. For example, a 16-way Sun SMP server and a 300G-byte Oracle relational database at the Fingerhut Cos. in Minnetonka, Minn., now do some of the order-processing work formerly handled by an IBM mainframe and IBM's tried-and-true IMS database [CW, Feb. 7].

Sun is said to be preparing a large-scale RAID storage system to ensure that such gigantic relational databases — which hold mission-critical data — can be reliably backed up for data recovery. In time, Sun will also leverage its 1993 partnership with Amdahl to add systems management software and file management routines to SPARC servers' system software.

At multivendor sites, other housekeeping issues have already surfaced. Large financial brokerages that use

Bozman, *page 71*

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Encore introduces scaled-down Infinity 90 model

By Craig Stedman

Facing slower than expected sales for its Unix-based Infinity 90 mainframe alternative, Encore Computer Corp. last week introduced a $200,000 entry-level model, the Infinity 90/SA, designed to make the massively parallel line more competitive with symmetric multiprocessing (SMP) Unix systems.

Quick change

Encore plans to switch the Infinity 90 from Motorola, Inc.'s 88110 RISC microprocessor to Intel Corp.'s Pentium by the end of the year, said Chairman and CEO Kenneth Fisher. Pentium will be Encore's main transaction processing engine.

The Infinity 90's previous starting price of about $800,000 turned out to be "a deterrent," especially with commercial customers who wanted a small machine to test the open systems waters, acknowledged Kenneth Fisher, Encore chairman and chief executive officer.

"Unless you were ready to start in a major way, we had a drawback," Fisher admitted. The two-processor Infinity 90/SA is positioned as a development system for doing pilot conversions of mainframe applications, he noted, and could later be scaled up to a larger Infinity 90/ES system.

Ready for the big time?

Nancy Stewart, an analyst at Dataquest, Inc. in San Jose, Calif., said the addition of the Infinity 90/SA could help Encore in its core defense and government markets. But she was more skeptical about the company's ability to become a big factor in the commercial sector.

"As far as any broad market appeal, that still hasn't come for them," Stewart said. Encore faces an uphill struggle in trying to compete with better-known SMP vendors such as Hewlett-Packard Co., Sequent Computer Systems, Inc. and Pyramid Technology Corp., Stewart added.

Cost considerations

Craig Lynch, Infinity 90 project officer at the U.S. Department of Defense's Defense Information Services Organization (DISO) in Denver, said the Encore system is "a superior technical machine" with compelling cost advantages over MVS mainframes. The Infinity 90 is one-tenth the size of a mainframe, and DISO expects its five-year cost of ownership to be 58% lower, Lynch noted.

However, government agencies, more than commercial shops, "would do the massive amounts of Unix processing that really fit the Infinity mold," he said. "Encore's biggest problem has been in marketing. They've been unable to get a foot into the major market areas."

The Defense Department has an Infinity 90/ES system running prototype CICS applications at its Columbus, Ohio, megacenter and is looking at implementing the technology in its other IS data processing facilities, according to Lynch. The Infinity 90/SA is too small to be of interest to DISO, he added. "It sounds like what you've got there is a file server."

Encore has installed between 50 and 60 Infinity 90 systems since it started shipping the massively parallel technology in 1992, according to Fisher.

RAIDing the market

Mainframe storage is another vein that Encore hopes to mine to make up for the slow pace of Infinity 90 business. Encore executives expect that a recent deal to supply redundant arrays of inexpensive disks (RAID) to Amdahl Corp. will become the company's biggest revenue generator.

Kenneth Fisher, Encore's chairman, said shipments of the RAID subsystem through Amdahl should "quickly outpace our system sales." But he added that Encore hopes users of the storage device will eventually want to expand it into a full Infinity 90 system by adding processor boards.

An Amdahl spokesman said the vendor has no plans to sell Infinity 90 technology other than the RAID unit. Fisher concurred, saying the letter of intent "covers only the storage side of the fence, but we think they have interest in the other side as well."

Amdahl and Encore said they expect to finalize their deal by the end of March.

Encore is adding 3880 and 3990 emulation capabilities to its RAID device so it can work with MVS and VM mainframes, and Fisher said shipments to Amdahl are expected to start in the third quarter.

— Craig Stedman

Trams upgrade gets interface bonus

Software Engineering of America (SEA) has introduced a snazzy module to accompany its Release 4.0 upgrade to Trams, an electronic data-transmission management system for mainframes.

The Trams/400 Interface allows an IBM MVS mainframe to automatically transmit data to AS/400 machines using LU6.2 protocols.

Although AS/400 machines have built-in transmission modules, SEA claimed its software package is faster and more convenient for AS/400 users. "The banking industry, for example, would find this of interest," said Mario Labita, SEA's Trams product manager.

The Trams/400 Interface is priced from $3,000 to $15,000. It is available immediately.

— Thomas Hoffman

Bozman

CONTINUED FROM PAGE 67

thousands of Unix workstations must ensure that customer transactions do not get erased during a power failure, for example. Even daily work loads can cause system downtime if interactive applications preempt batch-oriented tasks. Some users have written custom load-balancing software to ensure that the mix of tasks running on an SMP Unix server does not bring the whole computing "tower" tumbling down. Off-the-shelf load-balancing software is also surfacing from systems vendors.

PC users are hardly immune to lapses in housekeeping. IS managers in large corporations fret about it openly, concerned that data files are not backed up at day's end — and that some vital data remains on floppy disks and is never copied onto network file servers. Novell and Microsoft are well aware of these concerns and are building utilities that make it easier for systems administrators to archive user files on shared servers.

There are signs of a housekeeping revolution by 1995. First, vendors are rushing to rewrite mainframe and minicomputer job-scheduling and backup routines for use on Unix, OS/2 and Windows NT multitasking servers. Second, industry analysts are calling for a new generation of systems management software that dovetails with network management systems. And third, but not least, users are hesitant to step into the world of distributed computing without first trying some software that will keep their virtual computer rooms in order.

Bozman is *Computerworld*'s senior West Coast editor.

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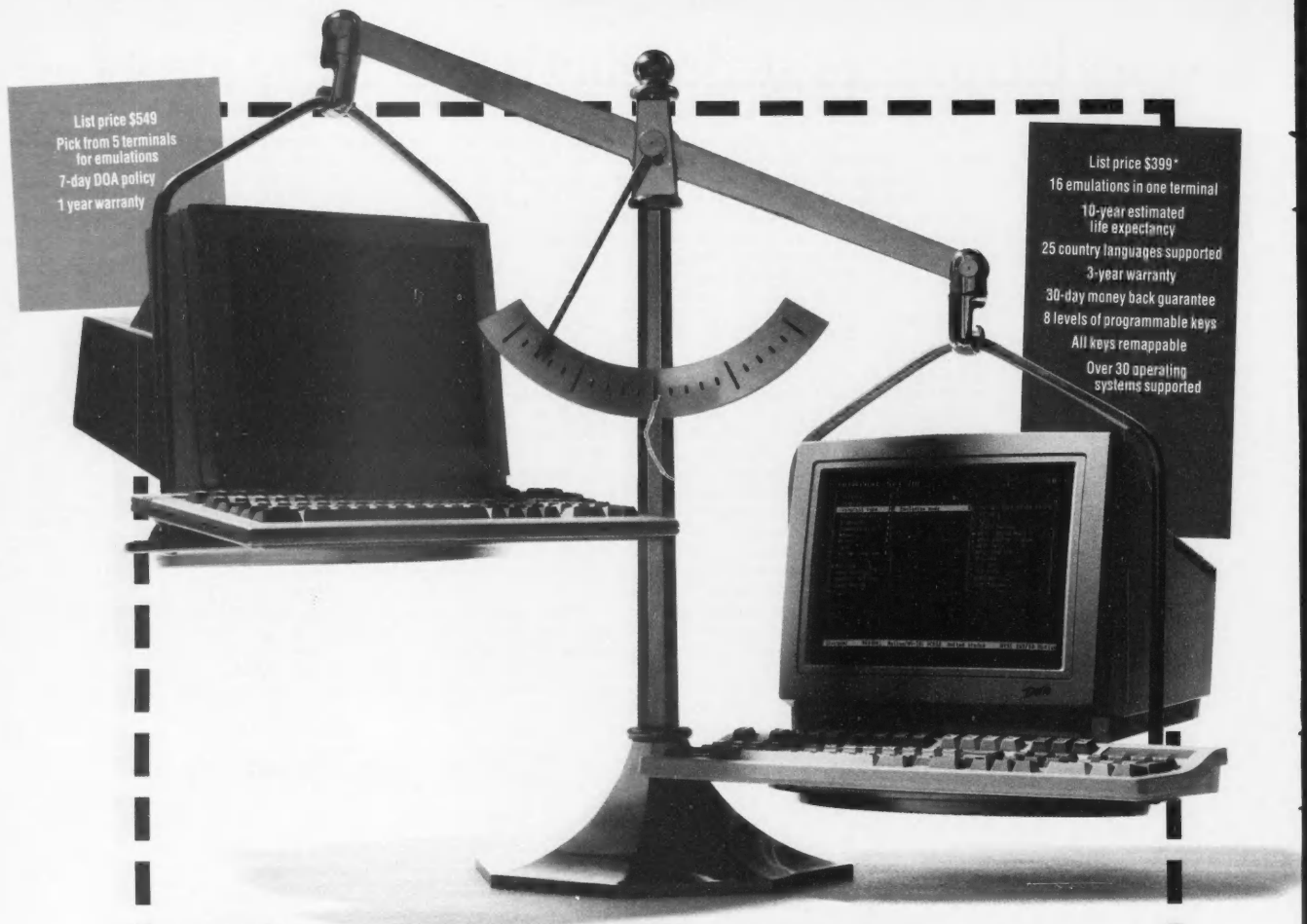

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New Products

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Information Builders, Inc. has announced an Enterprise Data Access (EDA) client/server software interface to IBM's Information/Management Version 6 for MVS/ESA.

According to the New York company, the EDA/SQL Data Driver interface provides Information/Management users with SQL-based desktop access and reporting capabilities through 100 EDA/SQL third-party front-end tools and applications.

EDA/SQL users can access Information/Management data in addition to the more than 50 heterogeneous data sources on interconnected IBM systems, such as MVS and RS/6000 AIX, and non-IBM systems such as Digital Equipment Corp.'s VAX, Hewlett-Packard Co.'s HP/UX, Sun Microsystems, Inc. Unix systems and a variety of other platforms and environments.

EDA/Data Driver for Information/Management prices are $13,300 to $22,000.

▶*Information Builders*
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Information Dimensions, Inc. has announced the Basis SGMLserver, a Standard Generalized Markup Language (SGML) storage manager.

According to the Dublin, Ohio, company, the product was designed to enhance a SGML publishing system by providing database management optimized for SGML documents.

Basis SGMLserver accepts, queries, retrieves and manipulates SGML document components as separate objects.

The product includes SGMLaccess and OpenAPI as callable interface tools.

Pricing begins at $7,000.

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Softbase Systems, Inc. has announced DGF, the Data Generation Facility for DB2. According to the Asheville, N.C., company, DGF reduces the time and costs associated with test data creation and improves the quality of the application system being developed.

Features include rule-based logic and the ability to populate columns from DB2 tables, VSAM and sequential files, the company said.

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Commentary

E. Ted Prince

The problem with multimedia

So multimedia is the wave of the future? That may be true, but it will also lead to even bigger project debacles than we have seen to date, and things will get worse before they get better. When it finally does have an impact, you and I will probably not be part of it. The Hollywood types will take over information technology instead.

Remember the halcyon days when we worked with 360s, assembler, black-and-white screens and characters only? All the programmer had to know was logic and how to solder. Now it's different — color, audio, video, GUIs, physical metaphors. How does a simple techie cope? Knowing C++ and Visual Basic just doesn't cut it. Applications are no longer just about code. They are about impact, experiences and psychological manipulation. Our programming courses lag far behind.

Understanding the impact

Our systems designers and technicians not only have to understand business objectives but what impact each of the plethora of multimedia choices has on the consumer. Do I use video here, or is it overkill? Color? Audio? Black and white? Film noir?

These decisions require a cognitive model linking behavior and application that doesn't exist yet. Until we get it, expect the more imaginative information technology projects that heavily use multimedia to fail absolutely or become white elephants, rather like Charlie Chaplin in his first talkie.

The fact of the matter is that traditional programming skills in all their forms are becoming obsolete. The programmers of the future will be creative types, prima donnas paid like film stars to create the next logical Terminator and the next electronic Madonna. They will resemble film producers more than logic writers.

Developing for multimedia

The film producers have already developed the cognitive models for multimedia through their Hollywood experiences; they just haven't heard of methodologies. Our future multimedia architects will combine their creative talents with logical and methodological skills to help programmers — the extras of the multimedia world — create these advanced experiential effects by rote.

So watch for multimedia systems integration and methodologies to soon hit the street. The Arthur Andersens of this world will soon be hiring film producers rather than just project managers to develop and implement the methodologies that will be the CASE tools of the late 1990s.

Our best multimedia types will be game software mavens, who are used to fun metaphors and skills. These people will gradually infiltrate the regular programmer corps, so don't fault your regular guys for illicitly playing games on their computers. That's the way we're going. Finally, systems will be fun.

Prince is president of Perth Ventures, Inc., a technology publishing and mergers and acquisitions firm in Hawley, Pa. He can be reached by CompuServe at 74073,1236.

Standard GUIs make sense

Could make users more productive

By Mitch Betts

It matters to users if they have to learn seven different types of menus. It matters to users when tapping the D key means Down in one application and Delete in another. It matters a lot.

Making users more productive (and less prone to errors) is reason enough to standardize graphical user interface (GUI) screens across all applications, but there are even more reasons.

Experts said a GUI standard that improves software usability will also reduce the number of calls from frazzled users to the help desk.

A third benefit is that programmers will not have to start from scratch every time an application calls for a browsing menu or some other common GUI element. Ideally, the GUI standard will have a template for how the screen should look and operate, backed up by reusable code to make it happen.

The hardest part is making the design standard a "living document" rather than a dusty book on the shelf, according to Eric M. Schaffer, president of Human Factors International, Inc., a Fairfield, Iowa-based consulting firm that specializes in helping companies create GUI standards.

That is certainly the case at the Royal Bank of Canada in Toronto, which developed a GUI standard last year and now struggles to keep it updated, write reusable code and get programmers to actually use it.

Six steps to a GUI standard

1. Gather data about users, workflows and business. — TWO TO THREE DAYS
2. Identify the types of screens that cover 85% of company needs — such as browsing, drill-down, form and search screens — and select a real example of each one. — EIGHT TO TEN DAYS
3. Have a GUI standards committee design the template for each screen type. — THREE TO FOUR DAYS
4. Draft the GUI-standard document. — TWO TO THREE WEEKS
5. Disseminate for a broader review and revise. — ONE WEEK
6. Train developers. Ensure the style guide is used, supported and updated. — ONGOING

Source: Human Factors International, Inc., Fairfield, Iowa

Developing standards

The bank has developed working models of the standard screens that "will probably become the standard more than the document," said Jamie Ingham, an internal usability consultant in the bank's information systems department.

Overall, "our emphasis was on reducing the amount of training and relearning necessary to use our applications," he said.

But Ingham said the big challenge is to get developers to use the standard rather than create screens from scratch. Techniques for overcoming that barrier include internal consulting or classes and getting top management to understand that time and money are wasted when the templates are ignored.

The most draconian technique is to send in the auditors, who can shut down a project that fails to comply with the standard. Thus,

GUIs, *page 76*

End-user support

Developers key to lower support costs

By Melinda-Carol Ballou

■ Developers can help mitigate the spiraling costs of end-user support in the world of distributed computing by using new organizational approaches and technologies for end-user and help-desk training.

These techniques are important for developers to adopt. Typically, application designers spend half their time — and usually more — answering end users' questions and providing related system support. This means they have less time to develop new systems or fix old ones.

According to nearly every research study on the topic of distributed computing, end-user support costs are rising. Some information systems shops are meeting this challenge by increasing the number of technical support staffers [CW, Feb. 28].

Looking for cures

But there are other remedies as well, according to users and analysts.

A recent study by Real Decisions Corp. in Darien, Conn., a subsidiary of Gartner Group, Inc., pinpoints some of the techniques used to combat rising support costs. One example is to adopt a layered approach to the help desk, where local people support the users closest to them and a central support staff can provide additional resources as needed. There are also some software packages, which are being developed in-house as well as purchased off-the-shelf, to help developers provide more efficient support.

Successful approaches

Users have adopted both the new organizational approach and the technology with success. Inland Steel Co.'s Utilities Operation Center in East Chicago, Ind., uses local support teams because "they become specialized in that field," said Adarbad Master, project engineer at the company. Therefore, they have the most appropriate understanding of local support needs, Master said.

He added that support makes up 75% to 80% of the costs at his organization, something he is trying to reduce by training more local support staffers. The local teams also input data to centralized IS, Master said.

The Chase Manhattan Bank NA in New York uses a centralized help desk and database to log support problems in the Manhattan area, according to Gene Friedman, vice president of applied technology. The

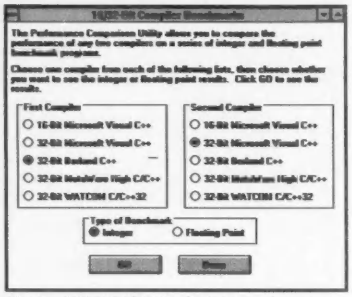
Support, *page 76*

Software development kits

Phar Lap kit gives DOS developers a break

By Melinda-Carol Ballou

Phar Lap Software, Inc. in Cambridge, Mass., is trying to make life easier for DOS developers seeking to create Windows front ends for 32-bit DOS programs, according to company officials and several customers.



Phar Lap's TNT DOS-Extender *lets developers put the Windows front end onto legacy DOS programs without rewriting the programs*

Beta testers spoke positively about the latest version of Phar Lap's TNT DOS-Extender Software Development Kit, which in addition to generating Visual Basic Windows front ends supports Borland International, Inc.'s new 32-bit DOS compiler. Borland's compiler was released late last year.

"The Windows support will be really useful when we port to Windows," said Ron Unz, president of Wallstreet Analytics, Inc., a San Francisco-based company specializing in high-end financial services software. "Also key for us is being able to use Version 4.0 of the Borland compiler, which has a very good debugger built into it."

No rewriting here

Release 6.1 of TNT DOS-Extender lets programmers put the Windows front end onto legacy DOS programs without having to rewrite the entire program, according to Phar Lap officials. Support for Borland's C++ 4.0 tools lets developers take advantage of Microsoft Corp.'s Windows NT while also using Borland's compiler, debugger and graphics libraries.

Features also supported by Borland include Dynamic Link Libraries, threads and multitasking, which developers can access using DOS-Extender to program within the familiar context of DOS.

Phar Lap's development kit includes TNT DOS-Extender, Microsoft's Code View 32-bit debugger and Phar Lap's 386\SRCBug source-level debugger. TNT DOS-Extender also supports Microsoft's Visual C++ 32-bit edition and other 32-bit compilers. Version 6.1 is shipping now and costs $495.

GUIs

CONTINUED FROM PAGE 75

enforcement can range from "gentle to gestapo," depending on the corporate culture, Schaffer said.

Ingham, resigned to the fact that it will take years for the GUI standard to be widely adopted by the bank's developers, had this advice for others: "Getting the standard done was the easy part. Keeping it going is far more difficult. Save your energy for that."

Getting a real GUI

Despite the challenges, many companies would like to have a GUI standard but do not know how to get started, Schaffer said. Some companies may believe they have a GUI standard because they use Microsoft Corp.'s Windows environment or the Open Software Foundation's Motif, but all they really have is a windowing manager that does not specify what should happen within the windows, Schaffer said.

Eric Schaffer *of Human Factors International: The hardest part is making the GUI design standard a living document*

Others buy a $2,000 electronic document of general design principles or rely on IBM's Common User Access guidelines, he said, but neither is specific enough or tailored to the company.

Schaffer argued that companies should create a GUI standards committee to come up with screen designs that fit the particular business' needs (see chart, page 75). The committee work can be contentious — each member will have an emotional tie to particular colors and fonts, for example — but writing the standard is actually the easy part.

"While it's appealing to assume that consistent user interface design can be accomplished by producing a style guide and putting it in the hands of designers and developers, in practice it's not so simple," wrote Robert Root, a technical staffer at Bellcore in Piscataway, N.J., in a recent research paper.

Root said the critical success factor is creating a process for consensus-building and "buy-in" among a variety of stakeholders; otherwise, developers will not accept and adhere to the standard.

Support

CONTINUED FROM PAGE 75

database, which was developed in-house, contains information about the people supported, what is on their machines and what is on the network they have access to, Friedman said.

"We built a database of issues and can do problem resolution not just on the particular issue but on the more generic 'why did it happen?' and 'what can we do about it?' " Friedman said.

The Mayo Foundation, a health care research institute in Rochester, Minn., is implementing an on-line problem-tracking package, according to Brian Shamblin, computer systems manager. This will enable end users to submit problems and potentially find their answers on-line "instead of bugging me," he said.

On the other hand, the knowledge in Shamblin's group is "so specialized" that he keeps in contact with other sites only on an "informal basis."

Still a challenge

But local support within the context of centralized IS is not easy to implement at all sites.

At New York University, for example, adopting support for individual sites and departments under the framework of central IS has been difficult due to the "federated nature" of the university, said Stephen Tihor, assistant research scientist. Each group, he said, has its own agenda and needs. "Organizational independence is a challenge."

Nevertheless, there are advantages to the idea of local support within a global infrastructure. A clearer definition of who does what supportwise can be an important cost-saver, according to Bill Walton, service director of distributed computing at Real Decisions.

Providing local support staffers to address local needs ensures that the people who best understand how the technology is being applied to meet business requirements are the ones addressing support problems.

Power links

On the other hand, links to the central organization give the local support people more firepower if they need it. In addition, central support can act as both a repository and a distributor of information that coordinates solutions at the far-flung sites.

A range of new training techniques can also cut down on end-user support requirements. Chase discovered that a variety of training methods help teach people more effectively.

"We find that you can't get by with just one training method; you need a whole spectrum of training tools," Friedman said. These methods include computer-based and hands-on training and video. There is also a move toward multimedia training at Chase.

At New York University, Tihor uses a combination of on-line and classroom training and standards, in an attempt to limit people to "work with the stuff we support so they know it cold — a simple trick but one that many companies sometimes forget."

The cost of doing business

According to a survey of 40 IS sites, support costs for distributed computing break down this way:

Technical services **43%**	• Installation and maintenance of hardware, software and LAN infrastructure • Moves, adds, changes • Database administration
User support **24%**	• Help desk • Training • Consulting
Planning and development **18%**	• Standards development and engineering • Technology assessment and transfer • Application development
Operations **8%**	• Operations of shared facilities • Backup and recovery • Performance monitoring
Administration and finance **7%**	• Accounting, billing and resource acquisition • Staff management • Service-level administration

Base: 40 sites whose average reflects the percentage of resources

Source: Real Decisions Corp., Darien, Conn.

Brief

Forecross offers migration

Forecross Corp., a San Francisco-based software company, has introduced Convert/VSAM-to-SQL, which automates the migration of VSAM applications to SQL database environments and client/server environments, according to company officials. The product offers the following options: data definition language statements to create required SQL tables, indexes and views; data migration so Cobol programs and SQL control statements are generated automatically; and automated migration of VSAM Cobol programs to standard Cobol SQL. The tool runs in MVS and OS/2 environments and is shipping now. Prices start at $50,000.

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Turn to Page 120

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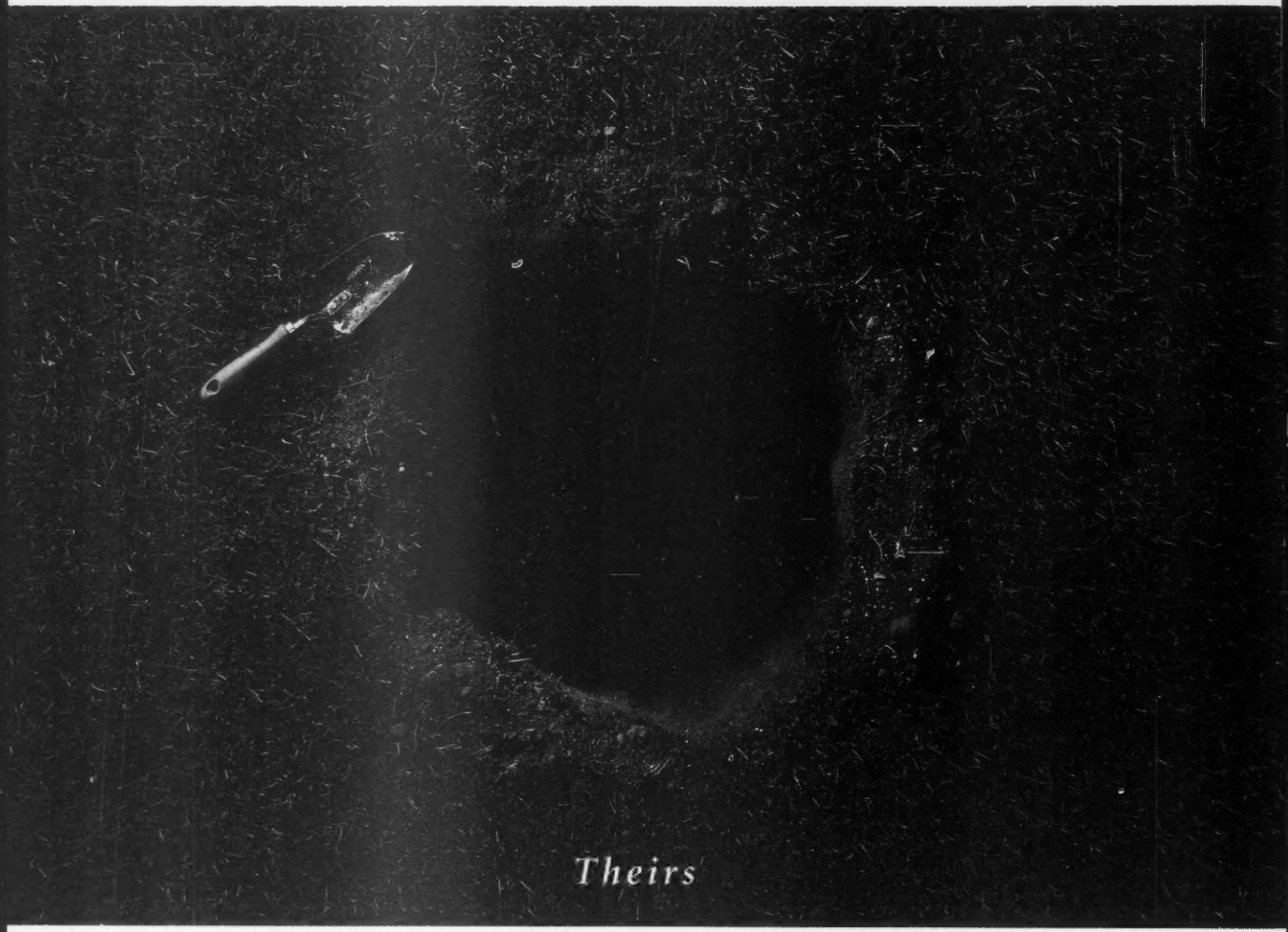

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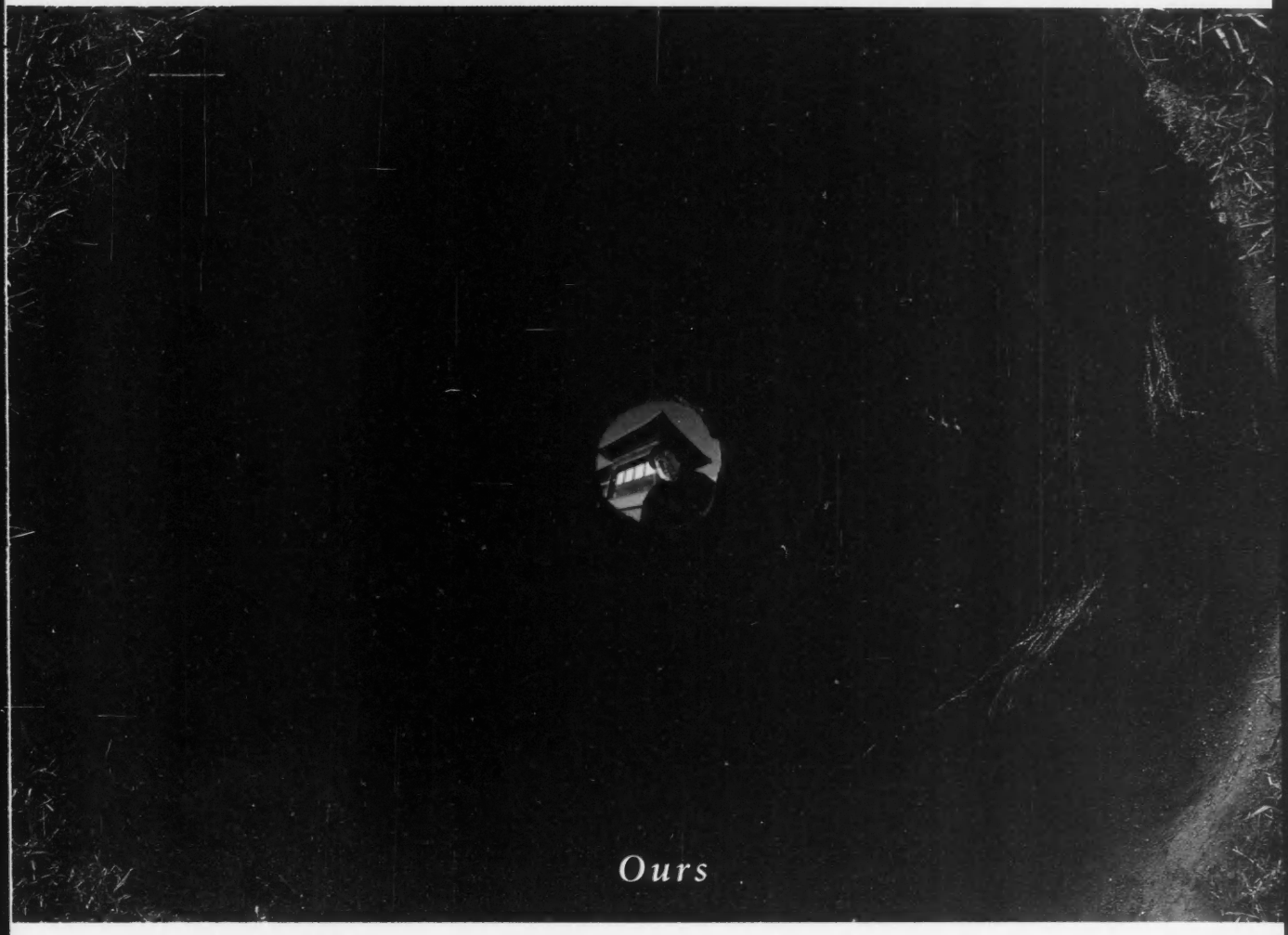

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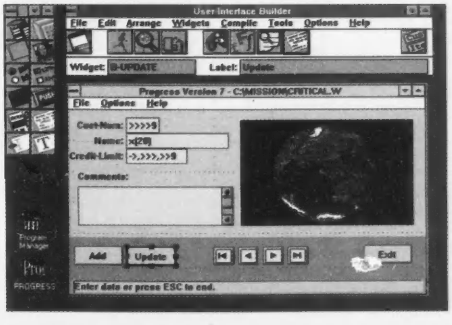

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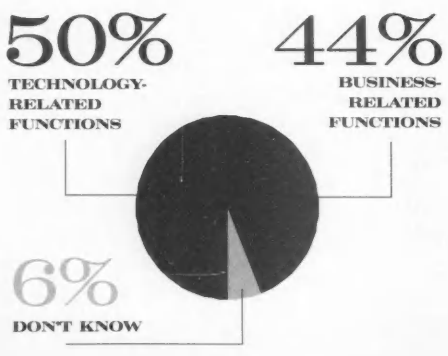
OPINION IS RE-ENGINEERING THE LATEST VERSION OF AN OLD SCAM?
Page 84

MEET THE NEW BOSS

A NEW TRADITION

An informal poll of 236 large U.S. companies found almost equal numbers of IS leaders from technology and general business backgrounds



Anyone not unplugged for the last few years knows that winning companies must blend technology and business. The big question now is: Who'll be the mix master? Answer: Not necessarily IS.

Consider some recent appointments:

Eight months ago, David Furth was just another user at Turner Corp. Today, Furth, a civil engineer, heads technology at the $3.5 billion international construction firm.

When Bank of Boston Corp. ousted Michael Simmons last fall, it didn't seek another journeyman chief information officer superstar. Instead, the $32 billion bank placed Vice Chairman Edward A. O'Neal, an experienced and information systems-saavy banker, at the helm of its 4,000-person technology operation.

Want more evidence? General Electric Co.'s first corporate CIO, named last summer, wasn't a career technologist. She was Helene Runtagh, a lifelong General Electric employee who rose through several assignments before becoming the head of General Electric Information Services, the megaconglomerate's IS unit.

THE TECHNICAL ISSUES HAVE NEVER BEEN TOUGHER. BUT "OUTSIDERS" CONTINUE TO WIN IS THRONES.

"Business is looking for leaders, someone it can talk to," says consultant Joseph Ziskin, who recently completed a detailed study of 50 CIOs (half from outside IS) for Ernst & Young. "The traditional [information technology] track is not preparing people for this position."

There's no question that in many large organizations, it's tougher than ever for techies to grab the technology crown.

A new *Computerworld* survey of 236 large U.S. companies found that executives with general business backgrounds now hold almost half of the top technology posts. Although no good, large studies exist, most agree that's nearly double the number of a few years ago.

Observers say it's too early to tell if "nontraditional" technology bosses are a passing trend or a major shift. Some speculate that the general manager/chief technology officer model will eventually replace CIOs altogether. (So far, titular CTOs remain rare.) Many believe the ranks of nontraditional IS managers will continue to swell.

The new breed isn't right for every company, of course. And new decentralized structures and technologies, notably client/server, are making a single technology czar far less important in some companies.

Nonetheless, the popularity and longevity of generalist managers in several forward-looking, IS-intensive industries — including banking, financial services and manufacturing — suggests future directions for technology leadership in big organizations. Your next boss could be one of "them."

A CEO'S DREAM

It's easy to see the appeal. Generalist managers are a CEO's dream: good motivators, good communicators and team players with a fanatical focus on the bottom line.

No wonder frustrated top management enlisted so many outsiders to shape up loosey-goosey IS groups or to better manage strategic IS assets during the last half-dozen years.

Consider how Edward L. Goldberg, a 33-year Merrill Lynch & Co. veteran who took over the firm's technology helm from DuWayne Peterson in 1990, describes his mission.

"Having been involved in the business really gives me a chance to say, 'Wait a minute, what will that pretty emulation do with the bottom line?' " Goldberg says. "We spent a billion dollars here on technology in 1993. We need to make the partners aware they need to earn money to pay for it."

Not exactly what Joe Cobol might say. Business types also come with another invaluable asset: instant connections and credibility.

"I'm sort of an insider," Furth says. "I've been on the other side of the fence. I understand what users do."

These folks understand the "alignment" be-

BY JOSEPH MAGLITTA

tween business and technology. Furth, for instance, recently held a conference in Dallas for his 70 top users. "Users need to take ownership of systems," he declares.

At Chemical Banking Corp. in New York, Denis J. O'Leary, senior vice president of IS, regularly invites top executives, including Vice Chairmen Ed Miller and Bill Harrison, to "candid and open" sessions with IS staffers.

These folks also *embody* alignment. Their posts bring close, easy access to top management. O'Neal, for example, is a vice chairman. Goldberg reports directly to Merrill Lynch's chairman.

No wonder many CEOs have decided it's wiser to teach business people technology than vice versa. Add the inability (or unwillingness) of many IS careerists to expand horizons and the temptation to say "sayonara, CIO" becomes even more understandable.

LIP SERVICE HURTS IS

IS must shoulder some blame itself, says L. Paul Ouellette, president of Ouellette and Associates Consulting, Inc. in Bedford, N.H.

Ouellette, who spent 34 years in top IS posts at Polaroid Corp., Raytheon Corp. and others, says many traditional IS heads pay only lip service to team building, empowerment, Total Quality Management and other important practices.

"CIOs ... throw two or three little programs out there," Ouellette says. "But there's no real buy-in."

All this begs the question: Have IS managers lost the helm of their own boat? Are they doomed to be first mates — or worse?

Not necessarily, according to IS observers and practitioners. But they caution that IS leaders must reorient quickly and act accordingly or fewer will qualify for choice top spots.

"Sixty or 70% of the people in top IS jobs still fondly remember the glory days when the big data center was theirs," says Beverly Lieberman, president of Halbrecht Lieberman Associates, a Stamford, Conn., executive recruiter specializing in IS. "God forbid if they lose their job. They were very competent people for a different era."

Katherine Loup, vice president at The Research Board in New York, says companies today want the brightest stars to direct technology. "The emphasis is on putting a string of capable people in the role," says Loup, whose prestigious consortium includes 90 of the nation's biggest companies. "Sometimes they are technical, sometimes they are not."

Lieberman and others affirm that CIOs with strong business backgrounds are much hotter in today's job market than career technologists. The most desired candiates bear MBAs, have headed a large IS division and boast experience with a big-name consulting firm such as Andersen Consulting or Booz-Allen Hamilton.

A recent survey by the 90,000-member Institute of Management Accountants suggests it remains difficult for IS leaders to be considered seriously for more powerful posts.

The Montvale, N.J., association polled 350 U.S. firms about attitudes toward IS, says Jonathan Schiff, a consultant and professor at Farleigh Dickinson University who conducted the study. According to Schiff, most organizations still consider IS a cost center that must be kept closely under the chief financial officer's wing.

"The CIO role has not captured the imagination the way the CFO has," he says. Only 5% of companies contacted had IS groups reporting directly to a CIO.

That dismal showing squares with the criticisms of CIOs by superstar consultant Tom Peters. In his latest book, *Liberation Manage-*

New boss, *page 82*

DAVID FURTH

TURNER CORP.

Joyce Ravio

JUDGED BY *empire size, David Furth is half the man his predecessor was. But this "outsider" and former user doesn't seem to care.*

Three years ago, mainframe downsizing slashed Turner's $20 million IS budget in half. IS head count also fell, from more than 50 to 20.

Traditional IS kingdom builders might have been devastated. But not Furth, a civil engineer who replaced former IS director Dick Shell last spring. Empowerment, he says, matters more than empire.

Turner "was looking to find an individual who understood the core business and who could work closely with [the] IS group to bring a level of practicality," Furth says.

At first, traditional IS staffers were skeptical, says Furth, who joined the New York-based firm right out of college in 1985.

"On the day before I started this position, I was a user going through all the trials and tribulations of a user," he recalls.

But after a "tremendous amount of reading" and innumerable questions, Furth says, he began to earn respect.

Furth, who reports to Chief of Staff Gary Thompson, has hammered away at the themes of productivity, service and alignment in the IS group.

He sees his role as being an insider bridge between the service provider and customer. "It begins to break down the stereotype of the IS guys [being] isolated from business."

EDWARD GOLDBERG

MERRILL LYNCH

Brian Smale

IN 1990, *Ed Goldberg got what many would have considered a dream job: replacing celebrity CIO DuWayne Peterson, who was retiring.*

Yet Goldberg, a Merrill Lynch veteran who started in 1961 as an office clerk and rose through the ranks, had a different reaction. "I was petrified," he recalls.

Today, Merrill Lynch's executive vice president of operations, systems and telecommunications isn't scared of technology any more. "It's exciting," he says.

He says his mission is "to take our financial consultants into the next century."

Fortunately, resources aren't a problem: More than one-fourth of Merrill Lynch's 41,000 employees work for IS. The roughly $900 million annual IS budget, half the amount from Peterson's glory days, is hardly paltry.

To attain this mammoth goal and plug gaps in his technical background, Goldberg relies on "a very big team" that includes a circle of trusted advisers and Howard Sorgen, senior vice president of global systems and technology. Weekly breakfasts and regular sessions with business heads keep staffers in touch.

Goldberg is against appointing a CIO. "If the CIO takes a role that's too narrow, it could be disastrous," he reasons.

The team has just finished tackling several re-engineering projects, including a total redo of back-office operations.

"You can really navigate through with good people," he concludes.

"OUTSIDER" INSIDERS

Here's a sampling of companies with technology leaders from primarily non-IS backgrounds:

AGWAY, INC.
Carleton E. Whittemore Jr., senior vice president, information services. Background in accounting, marketing, purchasing, operations, distribution, division management, corporate development.

BETHLEHEM STEEL CORP.
Walter N. Bargeron, president, services division. Ph.D. metallurgical engineering. Research, engineering, metallurgy, quality, senior plant manager.

DUKE POWER CO.
Jimmy R. Hicks, vice president, information technology services. B.S. electrical engineering. Engineering, customer service, general management.

FEDERAL EXPRESS CORP.
Dennis H. Jones, CIO and senior vice president, information systems. Masters accounting/finance. Finance and planning.

FLUOR DANIEL
William J. Mazilly, vice president information management. B.A. construction. Project and general management.

INTERNATIONAL PAPER CO.
Karl W. Moore, staff vice president and CIO. MBA economics. Finance, accounting.

PARKER HANNIFIN CORP.
Paul Carson, corporate vice president, information services. MBA. Production, general assignments.

New boss

CONTINUED FROM PAGE 81

ment, Peters criticizes IS managers for wasting efforts during the last two decades on unimportant tasks. Little wonder, Peters says, that two-thirds of IS leaders have had their jobs downgraded for failing to meet expectations.

FEET OF SILICON OR CLAY?

Despite their strengths, generalist technology managers have their drawbacks. Some are dangerously lightweight in technology knowledge.

That can be a deadly flaw, according to Charlotte S. Stephens, an assistant professor at Columbus College in Georgia who has studied successful CIOs. She notes that a fairly high level of technical insight is crucial for both credibility and good decision-making.

"CIOs need some technological expertise to sniff out whether the technology people are lying flat on the job or if they're being snowed," Stephens says.

Others worry that business-minded CIOs might focus too much on the short term and neglect thornier but crucial areas such as infrastructure.

Indeed, some say the growing complexity of client/server, graphical user interfaces and architectures may be swinging the pendulum back toward more technically-based CIOs.

"A good manager can manage anything," says John Rockart, director of the Center for Information Systems Research at MIT. "But they can't manage IS nearly as well as someone who understands the technology underneath."

Re-engineering evangelist Michael Hammer agrees the CIO/adminstrator role is fading.

"IS is no longer an unmanaged cesspool, which it was in many organizations — no budgets, no plans, no structure, just a bunch of hackers hanging around," says Hammer, head of Hammer and Co., a Cambridge, Mass., consultancy. "Now I think we've got to go beyond solving last decade's issues."

Hammer says IS leaders must now lead the transformation of IS while representing technology to the rest of the business.

A new British study arrives at similar conclusions. "Successful, value-adding CIOs invariably come from the IS function," wrote researchers Michael J. Earl at the London Business School and David F. Feeny at the Oxford Institute of Information Management.

The pair studied 14 successful CIOs and found that business transplants were *more* likely to founder in CIO roles. "A lengthy apprenticeship in the IS function, particularly in systems analysis and development, is the appropriate background for a CIO," they say.

Others note that the technology door swings both ways. As computers and networks play a bigger role in companies, techies have a better chance for advancement.

At Mayflower Transit, Inc., CIO and Senior Vice President Simon B. Morse also oversees human resources, quality, printing, mailing, grounds and several other non-IS functions.

Similarly, James B. Gustafson, vice president of IS at The Stanley Works, last year took over the corporate traffic department for the New Britain, Conn., tool maker.

Both men, career technologists, say they do not feel threatened by outsiders.

"Today, there are more opportunities to move into the user organization," especially in the lower ranks, Morse says. "There's no longer a limited, compressed MIS career path."

Still, there's no doubt that competition for top jobs is stiffer today.

In the past, pretty much every technologist was a candidate to lead IS, says Ron Brzeznski, former Quaker Oats Co. CIO and now principal at Transformation Associates, a Wilmette, Ill., consultancy. "Today, the figure is more like 30% to 40%," he says. "Still not a bad average."

He and others also note that company needs change over time. "There isn't a singular profile for CIOs. It's very much tied to company needs in stages of technology development," O'Leary says.

Of course, not everyone considers the growing business presence bad news — or even an issue. "Whoever is capable should have the top job," says Kevin M. Smith, a project manager at Burlington Air Express in Irvine, Calif. Plus, many in IS have no desire to become a high-level manager, Smith adds.

Gretchen Pavpore, information technology manager at Niagara Paper in Niagara, Wis., adds, "We're only a small operation. [Who's going to be CIO] is not a big issue here."

And CIO wanna-be's don't seem too discouraged: Nearly three-fourths of 1,400 people polled by *Computerworld* voiced hopes of becoming a top-level IS manager. And 81% agreed that "IS offers an excellent career track."

Certainly the old "data processing manager" job has become big and multidimensional enough to provide trouble for CIOs called on to serve as negotiator, research and development director, outsourcing manager, visionary, change agent, re-engineer and utility manager.

Frankly, IS could use the help. This week, a Deloitte & Touche survey will report that CIO turnover [17.5% in 1992] has risen for the sixth straight year.

"It's incredibly difficult to meet expectations in this career," says Jeff Plewa, a Deloitte & Touche partner in Chicago who headed the survey. "A lot of people are getting squeezed."

NO-WIN SITUATION

Others wonder whether anyone can succeed in the role. "Regardless of where [CIOs] come from, they are most likely doomed to failure," says Paul A. Strassmann, a New Canaan, Conn., consultant involved with IS since 1956 and a former Department of Defense CIO.

The problem, Strassmann says, is not that one kind of background is better preparation than another. The real issue, he asserts, is information politics.

"Is the data owned by the local lords? Or is data a commodity that is a corporate possession? It's the equivalent of medieval wars." In the absence of clear corporate governance, CIOs will continue to fall victim to competing factions battling to control information, Strassmann says.

In the short term, experts say technology bosses, regardless of background, must implement solid business practices, deliver stable basic services, develop strong second in commands and create change.

"If you don't build the relationship with corporate America and help the organization move foward," Ouellette warns, "the CEO will find someone who can."

The bottom line: The right person in the right place at the right time will find no shortage of headaches — and opportunities. ■

NECK-AND-NECK NO MORE

Over the last year, CIOs from business backgrounds were hired twice as often as technologists. Rates in previous years were nearly equal.

CIO's TIME IN POSITION	BUSINESS BACKGROUND	TECHNOLOGY BACKGROUND
LESS THAN 1 YEAR	11%	6%
1 - 5 YEARS	45%	51%
6 - 10 YEARS	24%	20%
11 - 20 YEARS	9%	16%
OVER 20 YEARS	7%	3%

SOURCE: *COMPUTERWORLD* SURVEY OF 236 LARGE U.S. CORPORATIONS

WHAT BOSSES WANT

The most important attribute of an IS executive:

STRONG TECHNICAL UNDERSTANDING	47%
BUSINESS SENSE	44%
COMMUNICATION/ PEOPLE SKILLS	36%
LEADERSHIP ABILITY	26%

SOURCE: *COMPUTERWORLD*/ ANDERSEN CONSULTING SURVEY OF 200 CEOs, COOs AND CFOs

EDWARD O'NEAL

BANK OF BOSTON

Jason Grow

YOU'D BE HARD-PRESSED *to label Ed O'Neal strictly a "business" type.*

True, the 24-year industry veteran oversees the Bank of Boston's 320 New England branches, its mortgage arm, an $11.2 billion private banking unit, consumer finance and affiliated New England banks.

But O'Neal also has IS experience any CIO would envy. At Chemical Bank, he oversaw Paris branch automation, led a pioneering home-banking venture with AT&T and Time-Life and served as vice chairman overseeing technology before leaving in August 1992.

"I've ended up being comfortable in both worlds," O'Neal says. He assumed his current role after a reorganization at the Bank of Boston eliminated the CIO post in October 1992.

Indeed, today O'Neal is as good a synthesis of business and technology as the hundreds of strategic systems that support New England's only global bank.

Despite his experience, O'Neal sees his role as that of a coach, not a captain. "I'm not here to manage the day-to-day operations or talk with vendors," he says. "I am a supporter and interpreter for the technical folks and adviser for the consumer business."

Daily affairs are handled by IS veterans Michael R. Lezenski and Albert C. Patterson.

While O'Neal acknowledges it's sometimes a struggle to keep up with leading-edge technology, he isn't worried.

"Around 80% of key technology is not new stuff," O'Neal notes. Technologically, O'Neal says the Bank of Boston has "spent the last 15 months getting on par with leaders." To that end, the bank is re-engineering and installing check imaging.

"My focus is on potential," he says.

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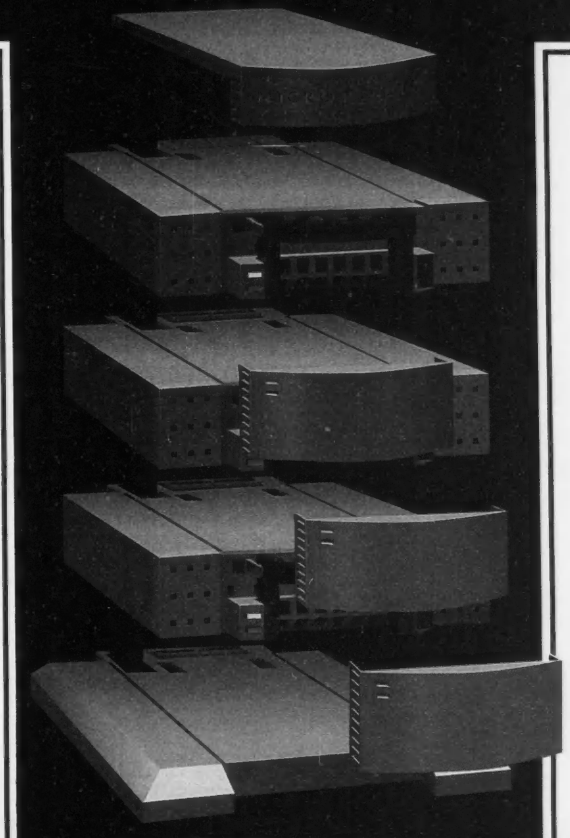
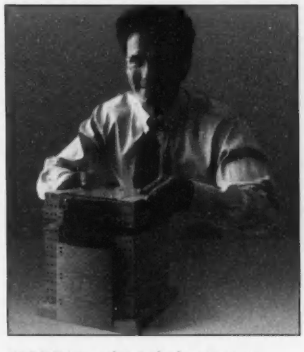


Reliable RAIDION can be configured with an on-line spare module that activates automatically upon a drive failure, ensuring continued fault-tolerant operation without human intervention. Hot-Swap and Hot Replacement features allow RAIDION to be serviced while your network remains in operation.

Award Winning In a benchmark comparison of arrays, Corporate Computing said: "*Raidion was our overall winner with an impressive combination of high performance, low cost, and unparalleled expandability.*" May 1993. RAIDION was also named LAN Magazine's Disk Array Product of the Year for 1994.

Economical An LT Series three module 2 GB array is only $6,585. An LS Series Raid 5 array with a capacity of 6 GB lists for $12,825. That's just $2.12 per MB. It's no wonder Byte Magazine said: "RAIDION's *low price alone makes it worth considering.*" August 1992



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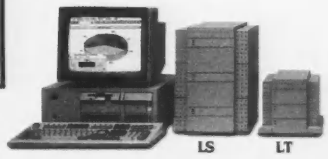

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Commentary

Efrem G. Mallach

Re-engineering: Read before investing

If you are an information systems professional, you see ads for business process re-engineering seminars as often as you get a cup of coffee. But before you invest $895 to attend one, read this old story about a stock market scam.

A swindler got a list of 10,240 investors and a list of 10 volatile stocks. He wrote to 5,120 of the investors that Stock A was about to go up. He told the other half it would go down. After halving 10,240 10 times, our scam artist had his real targets. He sent the 10 investors who survived the 10 rounds of cuts a letter reading, "I predicted 10 stock movements. Had you invested $100,000, it would be worth $2.6 million. I now have a fantastic opportunity. Just send me $100,000 to participate."

Reportedly, eight of them did. The moral: Any large set of random events will show some spectacular successes. Focus on them and there will seem to be a powerful influence where only randomness is at work.

What does this have to do with business process re-engineering? Simply this: If enough people try something, some will succeed dramatically. If no one mentions the failures, it can look as if success is universal. So here's my new method to develop strategic systems: Wear pink shirts and eat asparagus on Tuesdays.

> Here's my new method to develop strategic systems: Wear pink shirts and eat asparagus on Tuesdays.

By writing a prestigious paper with fancy jargon, I persuade 20 companies to try it. Normally, about eight would have average results, four would do a bit better and four a bit worse, two a lot better and two a lot worse. Naturally, that happens with Pink Shirts & Asparagus (PS&A) as well. Two firms have now achieved dramatic success using PS&A. They can never know what might have happened without it. They are firm believers in PS&A and are eternally grateful to its inventor.

We document PS&A benefits in exhaustive detail. I print fancy brochures with testimonials from the two users. The seminar sells out. The two users appear. Fifty firms start new PS&A projects. Of these 50 projects, five will succeed dramatically. I ignore the other 45. (Their shirts were stained, their asparagus overcooked.) Now I have seven case studies, testimonials and seminar speakers. My guruhood is assured. My consulting rates soar.

There is more to business process re-engineering than pink shirts and asparagus. But surveys, such as the Deloitte and Touche survey of 500 CIOs reported in *Computerworld* last March, show business process re-engineering results are indistinguishable from randomness.

Selective data

Most business process re-engineering projects do about as well as would be expected of any new system. Some do better; a few, a lot better. Some do worse; a few, a lot worse.

So why don't we read about the boring 90% in the middle or the 5% of disasters? Because nobody is proud of them. If you ask a guru about them, you'll hear the business process re-engineering equivalent of stained shirts.

The systems we read about are all from the positive tail of the curve. There is nothing new about the business process re-engineering concept. Our ancestors re-engineered food production when they moved from a hunter/gatherer society to farming. Henry Ford re-engineered automobile manufacturing by introducing assembly lines. Some firms are now re-engineering by taking assembly lines out. Re-engineering has been here for eons. Today, it is linked with IS. That is fitting. Creating re-engineering opportunities requires rapid change and wide applicability. When fractional horsepower electric motors were new, companies re-engineered processes around them.

Today, computers and communications are in the spotlight. They permeate the economy, so anyone can play the business process re-engineering game — unlike assembly lines, which aren't of much use outside a factory. Hence, most re-engineering opportunities today involve computers and communications.

What, then, should you do about business process re-engineering? By all means, re-engineer business processes every chance you get. Follow the gurus' guidelines: Start fresh, think "out of the box," focus on processes that matter, concentrate on the value those processes add, etc., etc.

But when all is said and done, a successful business process re-engineering project is 10% solid systems analysis that is intelligently applied and 90% common sense. If you need a seminar with a guru to tell you that, well, it's your $895.

Mallach is an IS faculty member at the University of Massachusetts at Lowell.

Executive Track

Cincinnati Bell Telephone has appointed **Rudolph J. Frank** senior vice president and chief information officer. He joined Cincinnati Bell in 1988 as senior vice president of technology and network services.

Frank also served previously as technical manager at AT&T Bell Laboratories. He was selected as a Sloan fellow at Stanford University and serves on the board of governors at the Communications Society of the Institute of Electrical and Electronics Engineers, Inc.

He also chairs the board of the Cincinnati Area Graphic Information System, a partnership between the city of Cincinnati, Hamilton County, Cincinnati Gas and Electric and Cincinnati Bell Telephone. The partnership was designed to provide an interactive and comprehensive database information system to enhance the development and infrastructure of the Greater Cincinnati area.

Michael S. Heschel has been appointed senior vice president of information systems and services at **Kroger Co.** in Cincinnati. In this newly created position, he will be responsible for directing the company's information systems and coordinating logistics and re-engineering programs. Heschel was previously group vice president of MIS.

Trinzic Corp. in Palo Alto, Calif., has named **Frederick W. Rook** chief technology officer at its Waltham, Mass., facility. He succeeds **Larry Harris**, who left Trinzic to start his own enterprise.

Rook joins Trinzic from Price Waterhouse, where he served as leader of the Advanced Computing Technologies Practice in Price Waterhouse's National Client/Server Initiative program.

Donald A. Marchand, dean at Syracuse University's School of Information Studies, will step down on June 30 to accept a senior faculty position at the **International Institute for Management Development** in Lausanne, Switzerland.

Currently serving as vice president for international relations at the Society for Information Management (SIM), Marchand's move to Switzerland will accelerate the society's progress in forming additional chapters overseas and increase the opportunities for SIM to partner with other IS organizations.

Michael Grisch has joined **Northwestern Travel** in Minneapolis as director of information services. Prior to joining Northwestern Travel, Grisch was involved with implementing technology in corporate and start-up operations at Honeywell, Inc.

Eric Schmidt has been named to the newly created position of chief technology officer at **Sun Microsystems, Inc.** in Mountain View, Calif. Schmidt was previously head of the corporation's Sun Technology Enterprises.

Nathaniel J. Johnson Sr. has been named director of IS and CIO at **Law School Admission Services** (LSAS) in Newtown, Pa. He will be responsible for managing a staff of more than 35 computer programmers and systems analysts. Johnson will also establish and maintain a computer network and telecommunications system for LSAS, the operating arm of the Law School Admission Council. The council is a membership organization comprising 191 law schools in the U.S. and Canada.

Prior to his recent appointment Johnson was executive director of the IS department of Prairie View A & M University in Prairie View, Texas. He was formerly manager of the information management services division for Milwaukee County in Milwaukee.

David D. Harrison, 46, has been named senior vice president and chief financial officer at **Pentair, Inc.** in St. Paul, Minn., a manufacturer of industrial products, power tools and paper products that is majority owned by General Electric Co. He succeeds John H. Grunewald who retired. Prior to joining Pentair, Harrison was vice president of finance and information technology at Camco, Inc.

Gerard H. Mesnel, 56, has been named to the newly created position of worldwide executive vice president of advanced technology at **Standard Products Co.** in Cleveland. His responsibilities will include product and process development.

William R. Spivey, 47, has been named vice president of systems and technologies at the AT&T Microelectronics unit of **American Telephone & Telegraph Co.** in New York. He succeeds **Curtis J. Crawford**, 46, who was named president of AT&T Microelectronics. Prior to joining AT&T, Spivey was president of a Tektronix, Inc. unit.

George B. Beitzel, 65, has been elected a director of the **Computer Task Group, Inc.** in Buffalo, N.Y. He succeeds **Robert Stephenson**, 55, an IBM vice president and president of IBM's World Trade Asia Corp. Beitzel is a retired senior vice president at IBM.

G. Glenn Henry has been named director at the PC Division of **Mips Technologies, Inc.**, a Mountain View, Calif., division of Silicon Graphics, Inc. His responsibilities will include developing processors for PCs. Prior to joining Mips Technologies, Henry was chief technology officer at Dell Computer Corp. in Austin, Texas.

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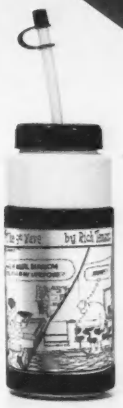

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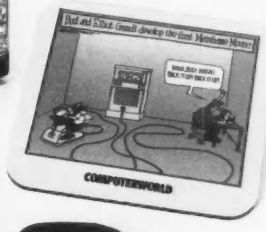

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COMPUTERWORLD
The Newspaper of IS

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Rob Hassell
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First Annual Los Angeles Computer Fair. Ponoma, Calif., March 18-20 — Contact: Computer Fair Hotline, (800) 800-5600.

Shaping the Future of Corporate Finance. Palm Springs, Calif., March 20-22 — Contact: American Financial Association, Boston, Mass. (617) 345-9700, Ext. 118.

1994 Platforms for Communication Forum. Phoenix, March 20-23 — Focus: Design of on-line videoconferencing salons, role of traditional entertainment companies in the world of "convergence" and impact on government agencies and policies. Contact: Daphne Kis, Edventure Holdings, Inc., New York, N.Y. (212) 924-8800.

"Focus on Operations." Atlanta, March 20-24 — Keynote speaker will be Larry Csonka. Contact: Association for Computer Operations Management, Orange, Calif. (714) 997-7966.

Second Annual Technology Manager's Conference. San Francisco, March 21-22 — Contact: IDG World Expo, Framingham, Mass. (508) 879-6700.

FOSE '94. America's Information Technology Forum. Washington, March 21-24 — Contact: Rosanne Desmone, National Trade Productions, Inc., Alexandria, Va. (703) 683-8500.

COMMON Spring Conference 1994. Anaheim, Calif., March 21-25 — Contact: Monika Paus, COMMON, Chicago, Ill. (312) 644-6610.

UniForum '94. San Francisco, March 21-25 — Contact: IDG World Expo, Framingham, Mass. (508) 879-6700.

North American Member Management Symposium XIV. Houston, March 22-24 — Theme: "The Next Management Challenge — Decision-Support Applications for HPC." Contact: RCI Ltd., Minneapolis, Minn. (612) 858-8830.

Seybold Seminars '94. Boston, March 22-25 — Contact: Seybold Seminars, San Mateo, Calif. (415) 578-6900.

Graphics Communication 3 1994. Philadelphia, March 24-26 — Three shows will be offered: Type-X, Art-X and Printing Expo. Type-X will stress what is new in electronic composition and desktop systems, Art-X will show the latest in design and layout capabilities, and the Printing Expo show will focus on developments in printing and finishing of all kinds. Contact: Graphic Communications 3, Cleveland, Ohio (216) 826-2878.

MARCH 27-APRIL 2

LAN Security. Washington, March 28-29 — Contact: Computer Security Institute, San Francisco, Calif. (415) 905-2626.

Lap & Palmtop '94. New York, March 29-30 — Focus: mobile computing. Contact: Laptop Expositions, New York, N.Y. (212) 682-7968.

APRIL 3-9

EDI 2000. Chicago, April 5-6 — Contact: EDI 2000, Dallas, Texas (214) 475-1838.

Rocky Mountain Telecommunications Exposition. Denver, April 5-6 — Theme: "Where Communications and Opportunity Meet." Contact: Sheri Prom, Tele-Communications Association, Denver, Colo. (303) 860-6125.

The Virtual Reality Forum 1994. New York, April 5-7 — Contact: Virtual Reality Systems, New York, N.Y. (212) 861-0588.

15th Annual Conference on IS Performance/Capacity Management. Phoenix, April 5-8 — Contact: The Institute for Computer Capacity Management, Phoenix, Ariz. (602) 997-7374.

Midwest Graphics '94. Detroit, April 7-9 — Contact: Graphic Arts Show Co., Reston, Va. (703) 264-7200.

APRIL 10-16

Association of Banyan Users International, Inc. Spring '94 Conference & Exposition. Atlanta, April 10 — Keynotes: "Building and Integrating Applications Using a Messaging Infrastructure" by David Whitten, office of information systems, Gartner Group, Inc.; "Reflections on the Future of Enterprise Networking and Messaging" by David C. Mahoney, CEO, chairman of the board, Banyan Systems, Inc. Contact: ABUI headquarters, Chicago, Ill. (312) 644-6610.

1994 KnowledgeWare International User Conference. April 10-13 — Contact: KnowledgeWare, Inc., Atlanta, Ga. (404) 231-8575.

Crossroads '94. Rancho Mirage, Calif., April 10-13 — Contact: Open Systems Advisors, Boston, Mass. (617) 859-0859.

NetWare User Conference. Providence, R.I., April 11-12 — Contact: Providence NetWare User Conference, Orem, Utah (800) 755-9898.

1994 National Association of State Information Resource Executives Midyear Summit. Boston, April 11-13 — Focus: national/federal/state issues. Contact: NASIRE, (606) 231-1905.

Managing Customer Service. Phoenix, April 11-13 — Contact: The Institute for Computer Capacity Management, Inc., Phoenix, Ariz. (602) 997-7374.

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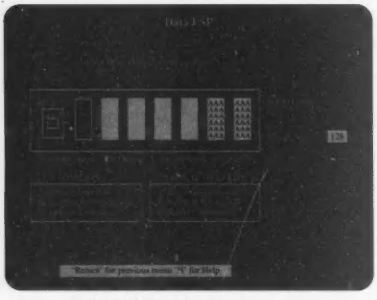

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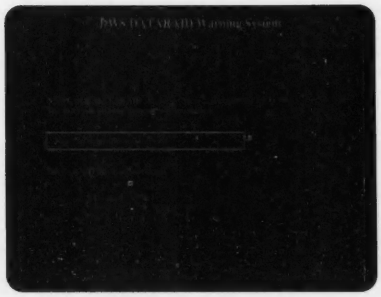
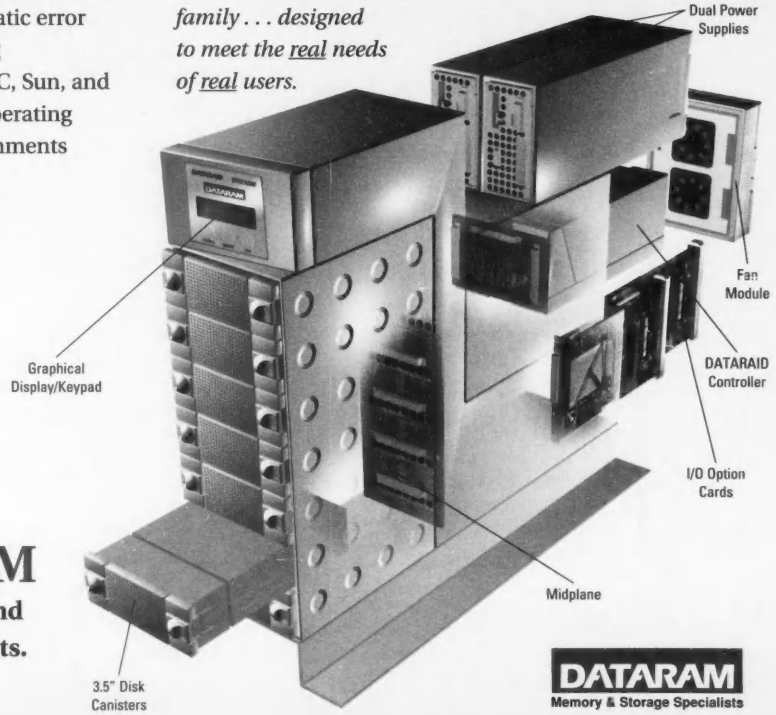
DATARAID's graphical user interface visually displays status of all components.



E-mail status report generated by DWS DATARAID Warning System.



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THE RIGHT TIME FOR RAID

IN ITS SIX YEARS OF EXISTENCE, RAID HAS INSTIGATED MORE TALK THAN IMPLEMENTATION. BUT WITH DROPPING COSTS AND MORE INTEREST FROM PC LAN ENVIRONMENTS, THERE'S REASON TO RETHINK THIS STORAGE TECHNOLOGY.

By Avery Jenkins

If the storage market were the Winter Olympics, RAID technology would be women's cross-country skiing. It is unknown and ignored by the majority, and it remains a difficult sell to a mass audience.

RAID (redundant arrays of inexpensive disks) is the 1988 brainchild of three researchers at the University of California. But while the concept has been around for a good while, commercial RAID systems have been available for only about three years.

Current RAID systems use multiple 5¼-in. disks to provide what appears as a single virtual disk to the host or the user. Smaller arrays run in the 5G- to 10G-byte range, and larger systems provide 50G, 60G or 70G bytes of storage per array. The largest RAID systems may offer as much as a terabyte of storage.

The main point of RAID is to offer a high degree of data capacity, availability and redundancy. The actual degree of fault tolerance varies depending on the RAID level you choose (see story page 92). But all RAID levels (except RAID 0) can reconstruct the data stored on any single failed disk in the array from the information stored on the remaining disks. In many cases, reconstruction can proceed with only minor fluctuations in end-user service.

Yet nearly six years after its conceptual debut, RAID still

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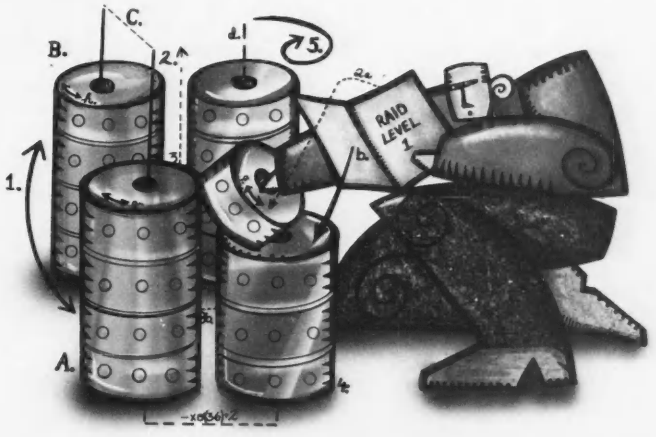
INSIDE

FIRING LINE: Compaq RAID, a costly but reliable alternative. Page 96

Which RAID level is right for you? Pages 92-93 and 96

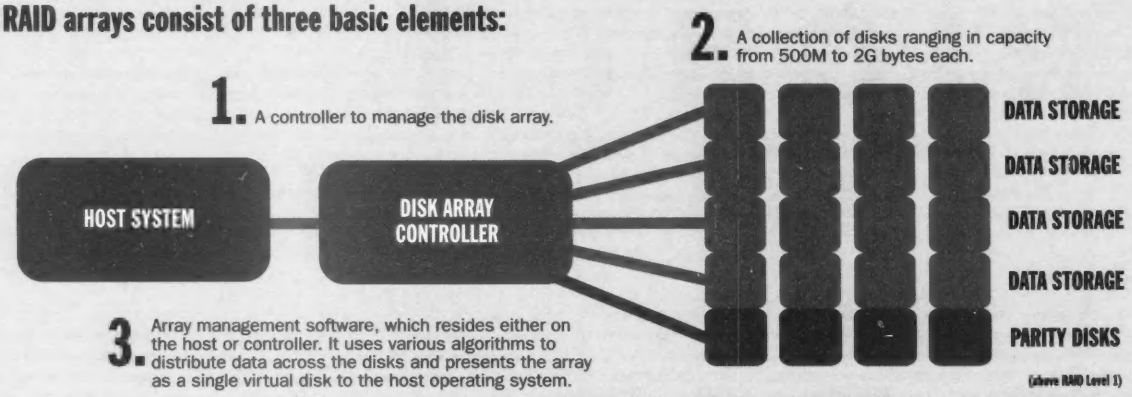
Dual power supplies and other reasonable demands. Page 99



How RAID works

Confusion abounds on RAID levels and types. Here are some bottom-line facts about this technology.

▼ RAID arrays consist of three basic elements:



■ The management software distinguishes RAID arrays from stand-alone disk storage devices. Its main job — data distribution — actually involves two tasks:

MAPPING, in which the system translates the array's virtual disk addresses into physical disk addresses. As an I/O request comes from the host, it is converted into syntax executable by the array's physical disks.

PARITY, which makes it possible to reconstruct data in the event of a disk failure within the array. (This is only available on RAID levels above RAID 1.) During a write operation, the system records parity information about the data on a separate disk or disks in the array. The parity information is essentially a number determined by adding up the value of all the bits in the data word. Parity does require some amount of overhead, ranging from 50% on RAID 1 to somewhat less than 20% on RAID 5.

■ Where the management software resides further distinguishes RAID systems. There are:

SUBSYSTEM-BASED ARRAYS, which execute management tasks in firmware on the controller. The controller is usually a RISC processor or, in some cases, an ASIC. Also known as "hardware RAID," these systems have the following attributes:

- **Higher cost.** Costs range from about $2.50 to $17 per megabyte.
- **Portability.** Usually uses standard buses such as SCSI to connect to the host, allowing subsystems to be used in a variety of hardware environments.
- **Hot-swapping and other reliability features.** Additional features may be incorporated into the subsystem to enhance reliability, for which users can expect to pay a premium.

Hot-swapping automatically substitutes an unused, available disk in the event of disk failure. Data is automatically rebuilt with little or no service interruption for the end user.

- **Predictable performance.** Because hardware RAID employs its own CPU on the controller to execute management tasks, performance is not affected by the server's communications and applications load. Conversely, the demands of the disk subsystem do not influence application performance on the server.

HOST-BASED ARRAYS, which execute management tasks on the host. The disks in host-based arrays are standard disks connected by conventional subsystem hardware components. This is also known as "software RAID." Its attributes include the following:

- **Lower cost.** At the PC LAN level, software RAID is extraordinarily cheap compared with its hardware cousin, ranging from $500 to $1,000 for the software itself. Users then purchase the disks, controller, cabinet and cables separately, obtaining the best price possible.

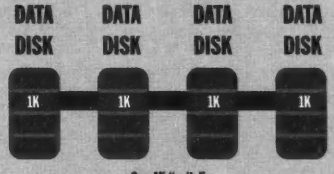
Because most of the hardware would be required by a non-RAID system, the cost of software RAID is only slightly greater than the cost of regular storage. And as the size of the array increases, this differential decreases as the added software expense is spread across a greater number of disks.

- **Unpredictable performance.** Because software RAID executes management tasks on the host, performance varies with server usage levels.
- **Limited functionality.** The interface between the disk and host computer is more limited than with hardware RAID and can affect array functionality. For example, software arrays cannot provide rotational synchronization of the disks, which can influence performance.
- **Connection to volatile software environment.** Instead of appearing as a standard SCSI device, as most hardware RAID subsystems do, software RAID is intimately connected to the operating system. As a result, applications may require optimization to effectively employ RAID.

RAID levels further distinguish systems from one another. See boxes at right for more information.

"Disk-striping"

RAID Level 0



One 4K "write"

No data redundancy. Data is broken up into blocks that are interleaved or "striped" across all the disk drives.

ADVANTAGES

- **Mapping is straightforward so management overhead is minimal**
- **Can execute multiple I/O requests in parallel so ideal for I/O-intensive applications**

DISADVANTAGES

- **No redundancy, so unfit for critical data**

"Block interleave with check disk"

RAID Level 2

Because it reads every disk in the array for every read operation, RAID 2 is a poor choice for frequent, short, random disk access. However, it provides excellent data transfer rates for large, sequential data requests; thus, it may be useful in applications with large files, such as video, CAD/CAM and multimedia.

"Bit interleave, error-correcting code"

RAID Level 4

Even though data is striped across disks, RAID 4 requires only a single disk to be accessed for an I/O request. This is because it stripes data at the sector (rather than the byte) level. Thus, it outperforms RAID 3 in read requests. However, writes are still hampered by the single parity drive.

RAID

CONTINUED FROM PAGE 91

faces barriers to wide acceptance. Its expense, which can be several times greater than an equivalent amount of single-drive storage, is a hurdle, as is its inherent complexity and the lack of general knowledge about the technology.

But all that could change. Not only are RAID prices going down (see story at right), but RAID interest is also increasing among at least one group of users — those in PC LAN environments.

The reason for such interest is in the numbers. In 1993, the average server disk capacity was only 2.5G bytes, according to Peripheral Concepts, Inc. in Santa Barbara, Calif., so "a network could hardly justify using a disk array," says Farid Neema, president of Peripheral Concepts. But by 1995, an average site will have 40G to 50G bytes of disk storage. As storage requirements grow, Neema says, the advantages of redundancy become more apparent.

The majority of new RAID products have also been aimed at the LAN storage segment.

IBM joined the RAID bandwagon in the middle of last year with its announcement of arrays for LAN and workstation environments. Data General Corp. added LAN capability to its Clariion line earlier this year, as did Digital Equipment Corp. A number of smaller vendors have released RAID products specifically for PC LAN and Novell, Inc. NetWare environments.

While vendors may finally be ready to sell RAID technology, the question that remains is whether users are ready to buy it.

MATHEMATICALLY SPEAKING

If the mean time between failure (MTBF) for each drive of a non-RAID four-drive subsystem is 150,000 hours, then the MTBF for the system is 37,500 hours. And since the drives are independent and nonredundant, the mean time between data loss (MTBDL) equals the MTBF. A five-drive RAID 5 array delivers the same amount of usable storage, and with the extra drive, its MTBF is lowered to 30,000 hours. However, because of the redundancy of the drives, the RAID array's MTBDL is 46,875,000 hours. (Pictured is Digital Equipment Corp.'s new LAN RAID system.)

The RAID elite

To date, RAID has attracted only those willing to pay the technology's higher costs in return for its reliability and availability advantages.

"If you think your data is critical, RAID looks like a pretty good deal since it provides a lot of protection against data loss," says Bob Katzive, president of Disk/Trend in Mountain View, Calif.

Not only do the arrays themselves offer high numbers for mean time between failure and mean time between data loss, but vendors also add fault-tolerant features, such as redundant controllers, power supplies and nonvolatile cache RAM, to provide an even greater degree of protection.

A shop-floor control system is a good example of a traditional RAID application. Shut down an assembly line or process, and it could cost you $100,000 per minute. But some users are expanding their use of RAID to general business areas.

John Calhoun is team leader of the information systems architecture team at AT&T's Atlanta Works division. His organization uses a RAID Level 5 array from ECCS, Inc. that is linked to each server on the NCR Corp.-based shop-floor system via multiple SCSI buses.

However, having had experience with RAID in the crucible of the shop floor, Calhoun says he is now preparing to put a RAID array on the division's office systems — running typical office applications such as word processing and spreadsheets. This is despite the fact

RAID, *page 96*

One barrier falls — cost

RAID prices are starting to drop and will continue their downward trend, eliminating RAID's most serious entry barrier.

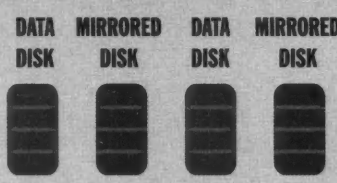
"It's only been 18 months since the first practical hardware controller was feasible," says Bill North, director of advanced products at RAID manufacturer Storage Dimensions. "Since then, there have been enough technical advances in RAID technology to allow further integration and further large-scale integration, which is more economical," he says.

"Prices are dropping so fast, any price list over six months old is obsolete," agrees Farid Neema at Peripheral Concepts.

Currently, you can expect to pay anywhere from $2.80 to $17 per megabyte, with average prices hovering around $6 to $7 per megabyte, says Dennis Waid, president of Peripheral Research Corp. But those averages are expected to decrease to around $2 to $4 per megabyte in the next year.

"Mirrored disks"

RAID Level 1



Each disk in the array is duplicated, increasing reliability and availability. Two controllers ensure no single point of failure. Read access is fast because the controller selects the drive that yields the shortest seek time. However, RAID 1 must execute every write command twice, so write performance suffers. Performance is governed by the ratio of reads to writes.

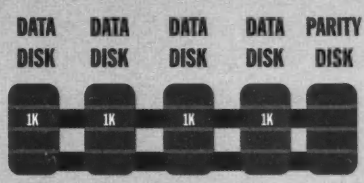
ADVANTAGES
- High data availability
- Good read performance
- Attractive cost per I/O per second

DISADVANTAGES
- 50% storage overhead
- High cost

OPTIMAL APPLICATIONS:
RAID 1 must execute every write command twice, so applications with greater write than read access requirements will suffer. Transaction processing applications work well here.

"Byte interleave, parity disk for error recovery"

RAID Level 3



One 4K "write"

Reduces the amount of parity information required because a single drive detects an error, while controllers incorporated into the drive controllers determine which drive caused the error. This combination allows correction of single-disk errors. (Spindle synchronization is required for best performance.)

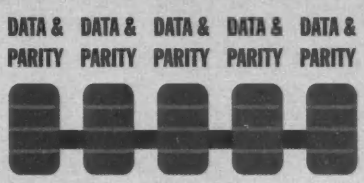
ADVANTAGES
- Minimal overhead
- High data transfer rate

DISADVANTAGES
- One I/O transaction at a time
- Large sector size

OPTIMAL APPLICATIONS
Applications that need a high transfer rate and high availability, such as multimedia; image and signal processing; application servers; multiuser systems; file servers with large structured files; and Unix and VAX systems.

"Block interleave with integrated check disk"

RAID Level 5



Similar to RAID 0 except it offers data protection. Instead of one parity drive, encoded data is spread across the array. This configuration removes the parity bottleneck of RAID 4 by distributing the coded data across all disks.

ADVANTAGES
- Minimal storage overhead
- Multiple reads

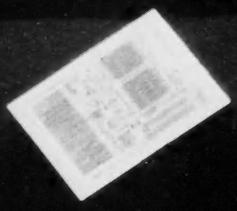
DISADVANTAGES
- Two-disk read and two-disk write for every update.

OPTIMAL APPLICATIONS
RAID 5 is the level most frequently found in LAN environments. It virtually eliminates the read penalty found in RAID 2 and reduces the write penalty by spreading the load evenly across all the disks in the array. Thus, RAID 5 has the characteristics most suitable for the I/O activity seen in many computing environments: a high transfer rate, moderate I/O and high availability.

Sources: Hewlett-Packard Co., Peripheral Research Corp.

Some See Client/Server Only As Technology...

Others As Results



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RAID

CONTINUED FROM PAGE 93

that his RAID storage "is two times as expensive as the stand-alone disk drives," Calhoun says.

For Calhoun, it comes down to decreased management costs. With a hot-swapping array that automatically rebuilds data from a failed disk onto a ready spare, Calhoun says "it will allow us to turn support of those systems over to a lower-skilled person."

According to Calhoun, the cost equation is simple: "We can't hire more people, but we can buy more hardware."

Choosing RAID

At Kelly Services, data availability and rapid growth were factors in its decision to employ RAID technology on a network running word processing and spreadsheet applications.

Dave Shiner, manager of technical services at the temporary agency in Troy, Mich., has begun augmenting his Dell Computer Corp. servers on Novell networks with RAID storage subsystems from Storage Dimensions, Inc.

The network supports 800 users on eight file servers, with storage requirements ranging from 1.5G to 4G bytes per server.

Many of the applications are stored at the server rather than at the local level, Shiner says. So when the server or its storage subsystem goes down, users not only lose access to server-stored data but applications as well.

"One of the biggest reasons we purchased RAID was just for the reliability," Shiner says. "If one of the drives fails, we can pull it out, slap a new drive right in, and basically the users don't notice any downtime."

Typical configurations

ENVIRONMENT	USERS	REQUIRED CAPACITY (in gigabytes)	BEST ALTERNATIVE
Office (small or large workgroup)	100 users	5	RAID 3
	500 users	50	RAID 5
	500 users	100	RAID 5
Transaction processing	Hotel reservation	2	RAID 1
	Airline reservation	20	RAID 5
	Retail chain	100	RAID 5
Decision support (multiuser interactive)	500 employees	5	RAID 5
	2,500 employees	50	RAID 5
Imaging	20 users	3	RAID 3
	100 users	15	RAID 3
Large, sequential I/O	Imaging site	15	RAID 3
	CAD/CAM site	6	RAID 3
	Multimedia site	50	RAID 3

Source: AT&T Global Information Solutions

With the old single-drive system, replacing a single 1G-byte drive took four to five hours, including restoring the data from tape backup, Shiner says. "It was ridiculous — the amount of time it would take us to recover from a drive failure."

While it was reliability that provided the impetus for RAID, it was rapid storage demand growth that opened the door for the new technology.

"Our storage requirements are growing 75% a year," Shiner says. "It's really pretty amazing. We're usually 60% full, no matter how much storage space we put on every year."

Crossing the drive line

While users such as Shiner and Calhoun are getting more reliability, capacity and availability from their arrays, they are not necessarily getting additional performance.

"In most RAID configurations, the performance is not the performance you would get in a single drive," Katzive said.

Of course, there are exceptions to that rule: Different levels of RAID provide optimum performance for specific types of applications (see chart this page).

But what generally impedes RAID speed is the increased amount of data massaging that must occur between controller and disk. As the data is broken up, parity is established and the data is finally written.

"There needs to be more work on the firmware" to increase performance, such as improved data allocation algorithms, says Dick Wilmot, consultant and editor of "The Independent RAID Report."

Performance of the RAID system is not currently a big concern in most LAN environments, where more typically it's the network itself that is the data-transfer bottleneck. But in the near

FIRING LINE

Compaq ProLiant server
provides good RAID support, but is still pricey

COMPAQ'S PROLIANT

- The Compaq ProLiant line of network servers provides comprehensive RAID and storage management options, evaluators said.
- They added that pricing was a bit higher than they wanted and technical support was adequate.

In the age of hardware downsizing, it only made sense that last year Compaq Computer Corp. in Houston announced its new line of ProLiant LAN servers with the bells and whistles to which information systems managers have become accustomed.

Primary among those features — in both the newer ProLiant and the older ProSignia servers — is an integrated combination of hardware and software providing RAID support and disk maintenance utilities.

With the high-end models of the ProLiant servers, Compaq provides an Intelligent Drive Array Controller-2 (IDA-2) and software functionality, collectively named Insight Server Management. The IDA-2 is also available as an optional add-on to other Compaq servers.

The 32-bit IDA-2 controller — which is an EISA bus controller — supports RAID Levels 1, 4 and 5. It includes a dedicated NEC Corp. V53 processor to control operation; 4M bytes of battery-protected, writeable disk cache; and firmware that supports a disk array of three logical drives. Compaq now sells drive array pairs in 680M- and 1.24K-byte units.

The evaluators who assisted in this survey included technical staff from a health care firm, a national professional association, a management consultancy and a university. They were using various models of the ProLiant with slightly different disk and memory configurations. However, all were using the Compaq IDA-2 controller.

The format for this evaluation was designed with the assistance of Howard Rubin Associates and Technology Investment Strategies Corp.

Reliability

Evaluators said reliability of the IDA-2 subsystem was nearly bulletproof. It includes support for RAID 1, 4 and 5. The battery-powered disk cache can maintain data for up to eight days if needed. A selection of software diagnostics and maintenance programs can dynamically repair bad sectors, keep track of drive faults, monitor the IDA-2 and automatically restart the server.

Consultancy: "I haven't had a single catastrophic failure in six months."

University: "It runs 24 hours a day with an average of 125 users at all times."

Performance

RAID subsystems, which by definition sacrifice performance for reliability, are often overlooked merely because they reduce

COMPAQ RESPONDS

Compaq's director of product marketing Mary McDowell responded to issues raised in this evaluation.

Demand has shifted away from the IDA-2 to our newer Smart SCSI Array Controller. Smart SCSI puts many of the features of the IDA-2 into hardware, and SCSI drives are less expensive. However, customers who have standardized on the IDA-2 continue to purchase it.

future, Wilmot says, with "multimedia servers incorporating full-motion video or simulation, client workstations are going to expect a fairly large transmission at a fairly high bandwidth."

The cost of performance

In their quest for ever-higher performance figures, however, many RAID vendors have created a rather sizable dent in RAID's much-touted data reliability.

The easiest way to ramp up performance figures is to employ sizable caches in their controllers. This has led to what Wilmot terms the "RAID write hole."

The RAID write hole is essentially the gap in time between caching and the physical write itself. Even in a single-disk system, a power failure during a write operation — between caching and the physical write — can be a problem. But with RAID, Wilmot says, the problem is more complex.

In most forms of RAID, the drive heads are not synchronized, so the data block may be written before the parity block. Thus, an outage between these two operations can create an out-of-parity condition with the system being unaware of it because the system saw the entire write process as a single operation.

The result, Wilmot says, is that when a disk is subsequently rebuilt, new data will be paired with old parity (or vice versa), scrambling the data where the out-of-parity stripe occurred.

"If a RAID 4 or 5 server suffered 10 outages and was doing extensive write caching, then it might have a few dozen to a few hundred out-of-parity stripes," Wilmot says.

The only sure solution for this problem is to use nonvolatile cache memory, which is still an expensive option.

RAID levels are also causing confusion. Not only do we have RAID 0 through RAID 5 but also RAID 5 Plus, 6 and 7. These labels mostly reflect vendor attempts to improve I/O or data availability.

RAID 5 Plus and RAID 7 are not accepted as standard nomenclature. However, RAID 6 was, in fact, described in a later paper by the original RAID researchers. It extends reliability by adding a second parity disk to a RAID 5 array. Thus, you get extremely high data availability (three disks must simultaneously fail for the data to be lost), but you also get increased overhead. There is also a severe write performance penalty, as two parity blocks must be written for each data block.

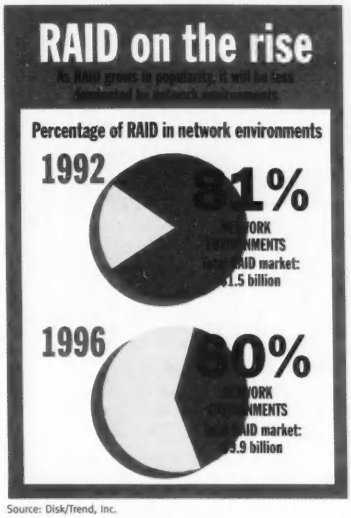
RAID futures

It is just such uncertainties with RAID — the lack of experience and knowledge about how it will perform — that could continue to keep RAID from a wider audience.

Despite these limitations, the market will likely expand in the LAN segment because of the changing face of computing. Some users, such as Calhoun, may employ RAID for a traditional high-reliability application and find it applicable to other unexpected environments.

Others, such as Shiner, may discover RAID as their networks assume the mainframe's mantle of responsibility, and rapid growth forces them to look for alternatives. ■

Jenkins is a free-lance writer in Ansonia, Conn.



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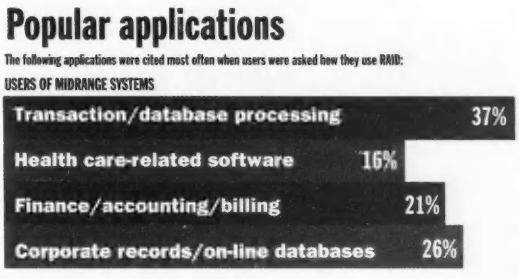


RAID FACTS

Estimated installed RAID storage in terabytes in 1993:
596

Installed capacity of all RAID and non-RAID disk systems in terabytes:
9,512

U.S. PC LAN sites reporting use of RAID Level 3 or 5:
11%

Average annual growth of LAN server capacity through 1995:
42%

Sources: Peripheral Concepts, Inc. and International Data Corp.

speed. The ProLiant IDA-2 overcomes some of this bias with its 4M-byte Array Accelerator Write Cache, which allows much higher performance than systems that write data directly to a slower hard disk. Evaluators said performance met their expectations.

Association: "We do some transaction work, and it seems as good as our old non-RAID server."

Technical support

The evaluators had little need for technical support. However, they concurred that they expected excellent support from Compaq and got it.

Health firm: "We use the CompuServe support. That's fine for us."

Installation

Installation was a little different from other servers and RAID subsystems.

One evaluator said he was somewhat stymied by Compaq's documentation; another said he found the documentation lacking in needed technical information, which he then had to obtain from Compaq. Otherwise, the evaluators reported no problems getting the system up and running.

Association: "We opened the box and swapped everything over in a few hours."

University: "Configuring the controller for RAID 5 was initially a problem."

Cost

Despite its re-emphasized approach to "value pricing," the evaluators said the ProLiant, the IDA-2 controller and Compaq's Insight Manager maintenance software were all in the moderate price range. They spent from $15,000 to $50,000 on their server configurations and said their total RAID expenditures were about one-half that.

Health firm: "The cost was not unreasonable compared to other RAID servers."

Consultancy: "We bit the bullet on the [proprietary] Compaq drives."

Utilities

The ProLiant comes with extensive utilities and diagnostics to monitor and maintain both the server and IDA-2 storage devices. Optional packages provide more reporting and management options, the evaluators said.

University: "The tools are there to solve most problems and to keep running."

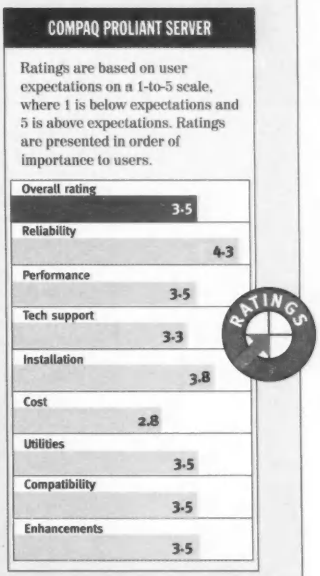
Compatibility

The IDA-2 is not a pure SCSI device and therefore does not support standard SCSI drives, the evaluators said. Compaq does sell a SCSI-2 interface for its servers, but it only supports RAID Level 1. IDA-2 users must use Compaq storage devices.

Enhancements

The evaluators, all of whom had longtime experience with Compaq products, said the ProLiant and the IDA-2 RAID controller were superior, state-of-the-art LAN server products. They said they liked the wide range of configuration, performance and recovery options and said those options rivaled those from other manufacturers.

Association: "This has more bells and whistles than other Compaq servers in the past." ■



COMPUTERWORLD'S FIRING LINE is an evaluation based on interviews with major users at corporate and educational installations. The product under evaluation is being used in live application environments.

Vendor choice can be tricky

By Dennis Waid

Choosing among the 130 or so vendors selling RAID systems today can be tricky business — especially among the smaller players in the PC LAN arena. During the past several years, a half-dozen companies that produced RAID solutions have discontinued their RAID products or disappeared entirely.

In fact, you should equate any redundant arrays of inexpensive disks (RAID) supplier search with the hire of a top manager: Be methodical in examining the vendor's qualifications, performance potential and monetary requirements — and don't neglect to check references.

The best approach in the LAN arena is to choose a vendor with a viable long-term history and a satisfied customer base. Usually, a recommendation from one or two customers is adequate, and most systems suppliers will provide names of references.

If you already have a SCSI-compatible server, you can purchase hardware/software systems from many trustworthy sources.

The companies with long histories in the disk drive or PC systems markets all have proven track records of reliable products and can provide sufficient systems integration. Such companies include Conner Peripherals, Inc., Compaq Computer Corp., Micropolis Corp., Dell Computer Corp. and Core International, Inc.

Another set of system and software suppliers offer well-tested products and have spent years developing RAID solutions. These include BusLogic, Inc., Dynatek Automation Systems, Inc., Storage Dimensions, Inc., Storage Concepts, Inc., AT&T Global Information Solutions (formerly NCR Corp.) and others.

The more risky solutions are the controller and software solutions from smaller companies not totally involved in RAID on a daily basis.

If you do choose a second-tier vendor, make sure you can find a nearly identical system from a different vendor in case problems arise. If that isn't possible, sign on with a larger service group authorized by the manufacturer that has the design and parts to repair the system.

Note the importance of buying a system that can scale up if your needs grow. It is best to prepare a system growth forecast to ensure that your planned or possible growth requirements can be satisfied by the same supplier. Switching to new systems and suppliers in midstream can be painful.

RAID solutions for midrange systems can actually be simpler than some PC LAN systems. For Unix- or SCSI-based systems, there are RAID software-only systems that will convert a string of drives to a RAID configuration, usually RAID Level 3 or 5. The NCR Disk Array Plus and Bus Logic products do exactly this.

Due to the technology level and research and development costs, the midrange RAID system suppliers will generally be older, more established companies. They include Micropolis, Digital Equipment Corp., Data General Corp. and AT&T Global Information Solutions. Generally, these systems will require more integration support than PC-based systems.

Many of the LAN server evaluation rules apply to midrange RAID as well and are perhaps more important because the products are more distinct from one another. The following are some guidelines:

- Be sure the company you deal with has several years of experience.
- Check whether there is more than one repair or service company.
- Check references with current customers.
- Prepare a questionnaire so questions to all of the interviewees are the same.
- Make sure the company offers some on-site warranty service during the initial ownership period. Generally, any critical problems will show up early in the use cycle of a RAID system. ■

Waid is president of Peripherals Research Corp. in Santa Barbara, Calif.

If you are comparing RAID systems, make sure they match up in the following areas:

- ✓ **RAID level**
- ✓ **Amount of cache or semiconductor memory**
- ✓ **Amount of disk memory**
- ✓ **Bus type**
- ✓ **Hot-spare/hot-swap capabilities for drives**
- ✓ **Redundant controllers/power supplies**

Cost, scalability and installation cited as RAID server weaknesses

EXCLUSIVE USER SURVEY

The leading midrange systems manufacturers offer a range of disk arrays for their own systems as well as Unix servers. A *Computerworld* survey of users of these products (see chart at right) found that the high price of redundant arrays of inexpensive disks (RAID) was the main complaint among the 38 users surveyed.

Scalability and installation difficulties were also noted as weaknesses. And while many of the respondents touted performance as a strength, many others said the I/O rate was much too slow.

Reliability was most often singled out as the best feature of RAID. Other strengths included performance, configurability, ease of use and expandability.

First Market Research Corp. in Austin, Texas, polled a sample of users from each of the featured subsystems to determine what the user community collectively viewed as the strengths and weaknesses of RAID technology.

	Data General Clariion Series 1000	AT&T Global Information Solutions 6298	Digital StorageWorks RAID Array 110	Hewlett-Packard Disk Array	IBM 7135 RAIDiant Array
RAID LEVELS SUPPORTED	0,1,3,5,1+0	0,1,3,5	0,1,5,1+0	0,1,5,6	0,1,3,5
CAPACITY	Up to 20G bytes	Up to 40G bytes	Up to 60G bytes	Up to 40G bytes	60G bytes
PERFORMANCE (I/O per sec.)	900	385	400	NA	NA
INTERFACE HOST	One to two SCSI-2	SCSI-2	SCSI-2	SCSI-2	SCSI-2
INTERFACE DRIVE	2 SCSI	SCSI-2	SCSI-2	SCSI-2	SCSI-2
TRANSFER RATES	20M byte/sec.	10M byte/sec.	20M byte/sec.	10M byte/sec.	20M byte/sec.
DIMENSIONS (H by W by D)	(24.8 by 10.5 by 30)	(29 by 12.5 by 28)	(24 by 14 by 15)	(14.6 by 7.6 by 16.1)	(10.5 by 17.4 by 26.2)
PRICE	NA	$26,891 to $75,975	Starts at $20,000	$7,500 to $18,100	$22,190 to $176,300

NA: Not available

'Why I use RAID'

By Steven Marks

In our 24-hour-a-day, seven-day-a-week Investment Banking Division at Lehman Brothers, there is one clear rule: There is no time for downtime.

Deadlines exist at all hours of the day and all hours of the night; bankers with a Monday morning filing deadline may have to work straight through the weekend. A missed deadline can mean the difference between a billion-dollar deal and a networking manager nervously shuffling through the help wanted ads.

That thought was clearly in my mind as we sought a solution to our disk reliability dilemma. Most storage solutions for Novell, Inc. LANs fall well short of our need for continuous operation — face it, at one time or another, everything will fail. You know it and I know it. At 3 a.m., however, a bank's analysts and associates don't want to hear it.

Disk mirroring, or even duplexing, doesn't get the job done for us. In theory, mirroring prevents a Novell server from failing due to drive (or fan or power supply) problems.

In practice, though, disk mirroring protects only your data; it doesn't guarantee continuous operation. Too often, a drive failure will also bring down the server gracelessly. And even if the server doesn't crash, you have to bring it down to swap the dead drive anyway.

RAID 5 systems have given us a powerhouse solution to our drive reliability issues. We run roughly 20 Compaq Computer Corp. SystemPro servers, each equipped with a 4G-byte RAID 5 subsystem from another vendor. RAID 5 provides us with storage that absolutely, positively won't go down.

Shopping spree

However, all RAID 5 systems are not created equal.

We looked at many before choosing a suitable array. Our actual list of viable candidates was very short, however. Quality of the vendor came first. We needed a vendor with an international presence so I could purchase and support redundant arrays of expensive disks (RAID) units for our international offices as well. Some vendor companies were too small to really support us overseas.

As for features of the products, some vendors don't bother to make the drives removable. I don't know what they think users would do when one failed. Another major manufacturer showed us an array with a single power supply. They were amazed when I rejected it. I wanted dual power supplies, and I wanted them to be hot-swappable, too.

The vendor asked, "How often have you ever known a power supply to fail?" But that was the wrong question. My response was, "How can I explain it when a power supply *does* fail?" She asked me if I then wanted dual power cords, too. Of course I did. I wanted to plug them into two different power sources because power fails, too.

Another key criterion for our RAID systems was that they allow our off-hours support staff to easily detect and correct problems. Trouble always seems to strike at 2 a.m. on a Saturday when I am off skiing for the weekend. By the time we diagnose the problem and bring in an engineer, downtime is already an hour, and we haven't started to work on the problem. But if the off-hours staff can simply slap in a spare drive, downtime drops to zero.

RAID 5 systems have given us a powerhouse solution to our drive reliability issues.

We also wanted a product that would automatically page a technician whenever a drive failed. You see, RAID is fault tolerant for only a single fault — in other words, if two drives fail at the same time, the array is no longer able to stay up and running. A double failure would be unlikely *unless* you didn't notice the first drive had failed, for instance because it was in a remote location or a locked closet. You may not be able to check the console frequently. That's why it was critical for us to select a product that offered automatic alerts of system faults.

A common complaint about RAID systems is they are slower than conventional drives. In theory they are. If your applications access the server drives constantly, switching to arrays may entail a performance hit. In our environment, though, we found no speed difference. (It helps that the array uses fast SCSI-2 drives.)

Drive arrays aren't perfect yet. I still want dual power cords. I also want them to be short so I don't have to bunch up all the cable. It would also be nice if the array monitor and alert software sat under a standard management console, such as Novell's NetWare Management System.

There is one final point. Redundant arrays of "inexpensive" disks — aren't. Arrays cost a bunch. But the cost can be justified in terms of uptime, continuity of service, ability to maintain systems with fewer technical staffers and the opportunity for the department manager to sleep well at night.

By any measure, RAID provides us with a level of stability and reliability we haven't been able to achieve with expensive mirrored drives. I expect it to continue reliably for a long time, even when it fails. And everything fails sometime. ■

Marks is a vice president at Lehman Brothers in New York.

TOP RAID IMPROVEMENTS USERS WOULD LIKE TO SEE

The improvements are verbatim responses taken from interviews with 38 RAID users. Improvements are listed in order from the most to the least frequently stated response. The respondent base comprises users of RAID subsystems from Data General Corp., AT&T Global Information Solutions, Digital Equipment Corp., Hewlett-Packard Co. and IBM.

1. **Increased capacity, denser drives**
2. **Lower overall cost, increased price performance**
3. **Improved scalability**
4. **Improved I/O rate**
5. **Easier means to recover lost data**
6. **Increased cache buffering**
7. **Increased Unix compatibility**
8. **Easier purchase of individual disks rather than disk blocks**
9. **Less confusing file structure**
10. **Easier installation**

Reluctance on the high end

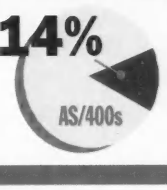
Mainframe and midrange environments have responded tepidly at best to RAID. The reason stems in part from the fact that storage pressures are lessening as they increase at the PC and LAN level.

Connection issues between host and RAID subsystems are also more complex at the high end, limiting the number of third-party products. For example, the closely guarded patents on Digital Equipment Corp.'s DSSI and CI buses have prevented all but a handful of vendors from successfully creating RAID subsystems for these environments.

In short, the mainframe and traditional midrange multiuser sites represent a relatively stagnant market with expensive dues. And with the major systems vendors — which have the most at stake in supporting this area — such as IBM showing little interest in supplying the high end with significant RAID technology, it is unlikely that others will rush in.

SLOW GROWTH FOR RAID

In a recent survey conducted by International Data Corp. (IDC), 14% of respondents in AS/400 environments reported that RAID was significant in their storage subsystem purchases — an increase over the previous year.



It's worse in the mainframe arena. The percentage of IBM mainframe customers planning to employ RAID decreased from 14% in 1992 to 8% in 1993, according to IDC.

FOR MORE INFORMATION on RAID, contact the RAID Advisory Board

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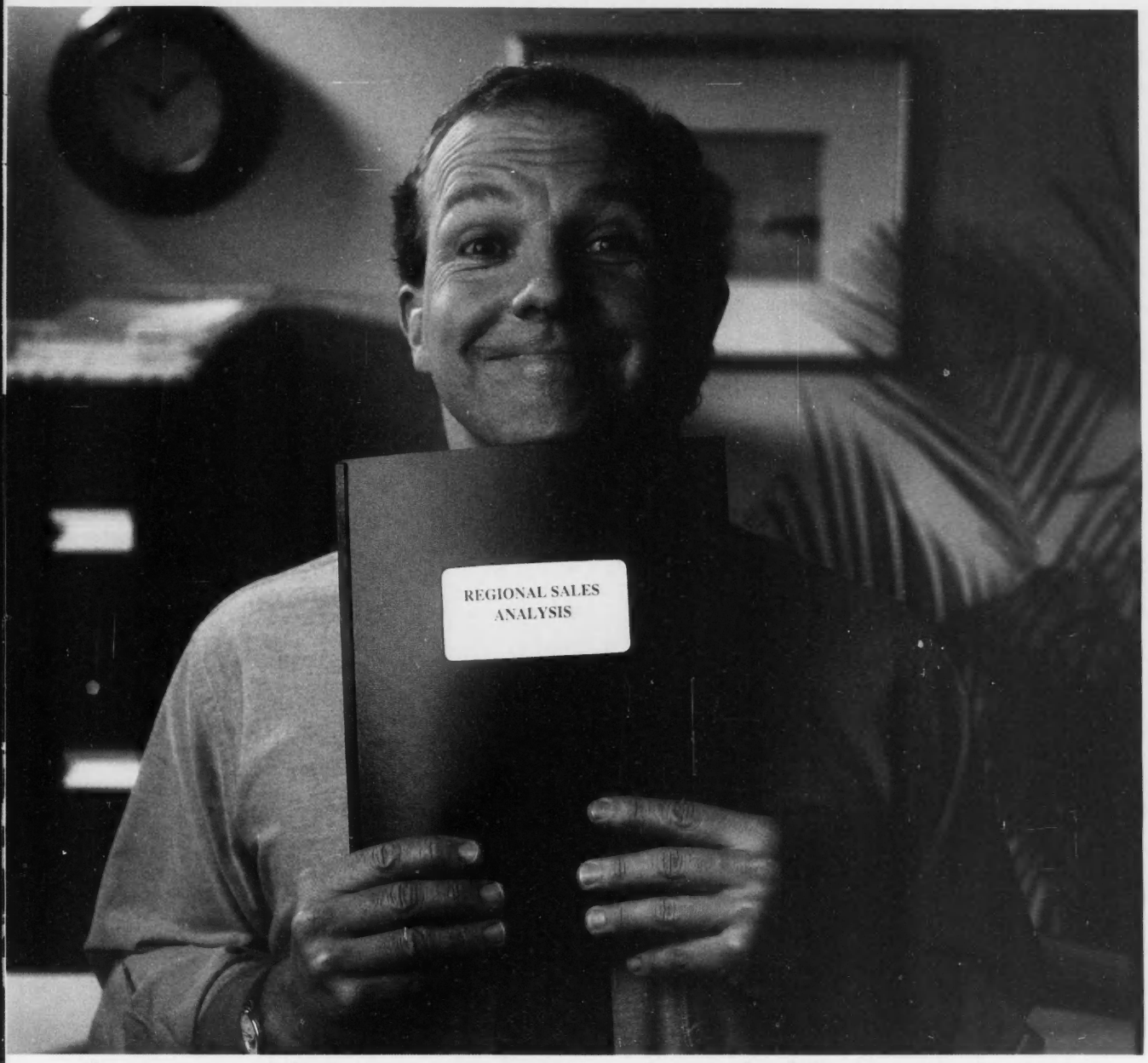

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MAINFRAMERS IN transition

IN THREE TALES FROM REAL LIFE (HELL?), PROGRAMMERS WHO'VE MOVED FROM BIG-IRON CODING TO SMALLER SYSTEMS SPEAK OF FRUSTRATION AND ACCOMPLISHMENT

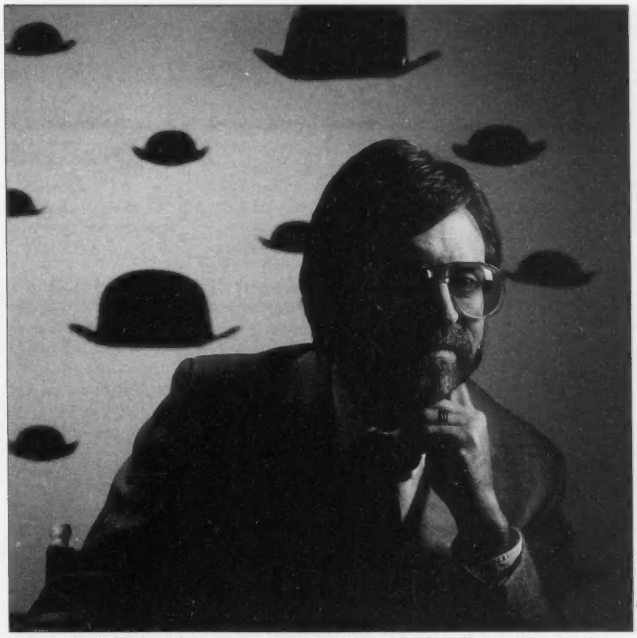
BY JOE PANEPINTO

It struck Jake Wilson that the hardest thing about his move from the mainframe to Unix and client/server worlds was the range of new options — options for such things as user interface design, systems management and hardware configuration.

"In the mainframe world, you don't have as many options — maybe you can adjust parameters in CICS or tweak database environments to suit certain situations," says Wilson, a senior advisory systems engineer at GTE Data Services in Temple Terrace, Fla. "But it is nothing like the range of things you can do in the Unix world."

Like Wilson, there are scores of mainframers going through the trauma of transitioning to new development platforms. For many, it is a matter of learning new PC, Unix, object-oriented, LAN or client/server skills — or finding an employer who appreciates the old skills.

It's hard to avoid making the transition. According to Scott Sherer, president of NASPA, the Association for Corporate Computing Technical Professionals, there are about 10,000 organizations with mainframes in the U.S. (each of which may have more than one mainframe), down from a peak of about 13,000 in 1990.



CHRIS CASWELL

GTE's JAKE WILSON: *With a new environment, 'you go back to the starting point'*

Sherer's organization has seen the shift from mainframes to PCs, Unix and client/server reflected in its membership, which once consisted only of people with mainframe skills. Today, almost all members have programming or systems management duties on platforms other than the mainframe.

For those making the switch, attitude and initiative are all-important, according to managers and staffers.

Access to mentors, management patience with personnel climbing the learning curve and adequate training have an equally crucial impact on whether or not a transition is successful.

Some companies have helped lessen staff fears that lower productivity or time away from work for training will leave a mark on their records. These firms have acknowledged such circumstances by adjusting individual's performance goals.

"In most cases, companies have faith that their employees are going to be able to make

Mainframers, *page 104*

Panepinto is a free-lance technology writer and doctoral student in communications at the University of Massachusetts at Amherst.

Mainframers

CONTINUED FROM PAGE 103

this leap, though it certainly is a big challenge," says Heidi Dix, an analyst at Forrester Research, Inc. in Cambridge, Mass.

Below are the stories of three dyed-in-the-wool mainframers who have faced the challenges and frustrations of making the transition to object-oriented, PC LAN and Unix environments and have come out on top.

Chris Cowell

IN transition: JAKE WILSON

AGE: 45
SENIOR ADVISORY SYSTEMS ENGINEER
GTE DATA SERVICES
TEMPLE TERRACE, FLA.

"I guess there are some people who find a niche and are comfortable to stay there," Wilson says. "I'm not one of those people."

And it's a good thing, too. In GTE Data Services' project to downsize a slew of mainframe applications to Unix-based LANs, Wilson has had to wrestle not only with Unix, C and shell programming but also with what is arguably the most difficult Unix task — systems management.

That's a lot to ask from a guy who has a background in Cobol, CICS, IMS and a host of IBM mainframe applications and languages, including assembler.

"To take a typical programmer from the mainframe world and make him a programmer in the Unix world, it takes a certain amount of training, mentoring and experience to pull off that transition," Wilson says. "But if you are a solid programmer, that transition should not be that difficult."

Unless systems and network administration get in the way.

Wilson was used to working with mainframes, which meant having an environment set up for him so he could just sit down and write Cobol code. In the downsized world of PCs, workstations and Unix servers, such things as version control, workstation and PC configuration and backup have to be taken into consideration when writing software.

Wilson says he believes his experience as an assembly language programmer and as a mainframe application developer building large multiuser systems will help him in his transition. His knowledge of assembler has given him a much better feel for the nitty-gritty of computing and enabled him to learn any third-generation language (3GL), such as C, more easily than someone moving from a 4GL or another 3GL.

As for the advantages accrued by having built multiuser mainframe systems, they center on issues of data integrity.

"If you are used to building applications in any environment in which lots of people are hitting files at the same time, then you are going to think about the integrity of the data," Wilson says. "I would say it is not so much an issue of the platform you have experience on, but the type of applications you've built."

Even so, he warns, the move from mainframes to Unix isn't without its frustrations.

"When you take that step into a new environment, you go back to the starting point. Everything that came easily with a decade or so of experience is pretty much gone," Wilson says. "You used to know things off the top of your head, and now you feel like you're pulling manuals off the shelf constantly."

Wilson says his managers have been supportive throughout his transition by providing training and releasing him from day-to-day duties — items formally acknowledged in his job requirements and performance review. He also has access to mentors, namely three skilled Unix programmers on his 10-member team.

"You have to understand you're going to be frustrated for a little while and just accept it," Wilson says. "The harder you work to broaden your skills in a new environment, the more quickly the frustration goes away."

THE manager's VIEW: Ron Thompson

MANAGER
INFORMATION MANAGEMENT TECHNICAL TRAINING
GTE DATA SERVICES

"We only retrain people who show they really want to do it, because they have the greatest possibility of success," Thompson says. "We don't try to force-fit people because that never works."

IN transition: DAWN BONEHAM

AGE: 31
INFORMATION ENGINEER
KASH N' KARRY FOOD STORES, INC.
TAMPA, FLA.

Dawn Boneham considers herself "a decent problem-solver" and a self-taught mainframer. The list of languages and operating systems she has learned on the job in her 10 years, going from programmer to systems analyst, reads like the index to an IBM manual on mainframe programming — Cobol, CICS, IMF, IMS, PL/1, JCL, DB2.

She is used to picking up skills on her own and sees learning as an integral part of what information systems personnel do on a day-to-day basis.

This attitude has served her well in Kash n' Karry's ongoing transition to an object-oriented programming environment.

"I've spent my whole adult life learning new things and that has helped in the transition," Boneham says. "I'm not one to go through manuals for hours on end. I do better sitting down with someone who knows it better than I do or by playing with it."

But before Boneham could start playing with building object-oriented applications in Smalltalk, she had to learn entirely new rules for what seemed like an entirely different game. When the employees and management of Kash n' Karry bought the company from its parent in 1990, Boneham helped transfer more than 3 million lines of code from one mainframe to another.

Later, when the company decided to downsize its DB2, IMS and flat-file applications to an Informix relational database management system on Unix, she picked up her first nonmainframe skills.

To Boneham, that change in skill sets was not very dramatic. After all, "SQL is SQL, even if the syntax may be a tad different," she says.

Unix was a bit harder to learn, but only because the commands were foreign and at times ambiguous. For example, the meaning of "-a" in Unix may change from command to command: entering "ls -a" gives a list of all hidden files; entering "ps -a" gives a list of all processes owned by other people.

Even with such quirks, learning Unix did not mean Boneham had to pick up an entirely new way of thinking about computing.

Object-oriented programming did.

"In any kind of procedural language you are breaking down workflow and coding it," Boneham says. "In object-oriented design, you're breaking down events and assigning responsibilities to objects and not really dealing with workflow anymore."

In some ways, thinking in terms of procedural language is unnatural — you are trying to manipulate the world into procedures by separating the data from what is happening to that data, she says. In object-oriented programming, you must think in terms of events and must design applications in an entirely different way.

For example, in building an object that will store prices, the programmer has to make a design decision about where to put the responsibility for calculating effective dates — in the object or in the application or controller objects. (Some objects deal directly with data, while others are at a meta level, dealing with an object's behavior.)

The initial decision about how changes are made will affect how developers build objects

Mainframers, *page 107*

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- Industry Dynamics - The IDC Perspective
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- Industry Competition
- Digital Media Convergence

1:40-2:15	2:20-2:55	3:20-4:00	4:00-4:40
TRACK 1 - PERSONAL SYSTEMS			
Opportunities and Dynamics in the Worldwide PC Systems Marketplace	Burning Down the House: PC System Software Technology Changes Fan the Flames	Positioning for Profit in the PC Mass Market	Channels in the Year 2000: A Blueprint for PC Distribution
TRACK 2 - SOFTWARE/SERVICES			
Outlook for the Service Industry: The Planning, Implementation, and Management of IT Solutions	Revolutionizing IS Through Business Process Reengineering	Software Bundling: Here Today ...	Software Roadmap: Winning Product and Business Strategies for the '90s
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Mainframers

CONTINUED FROM PAGE 104

and views throughout an application.

"Where you place your methods and data in object-oriented programming is very important," Boneham says. "People who haven't got a lot of experience in regular mainframe programming may have an advantage in picking up object-oriented [programming] because they don't have anything to unlearn."

Homework

Boneham did several things to get into the object-oriented mind-set, including reading books such as Donald Norman's *The Design of Everyday Things* (Doubleday), Gary Entsminger's *The Tao of Objects* (M&T Books) and Timothy Budd's *An Introduction to Object-oriented Programming* (Addison-Wesley).

Boneham also subscribed to Usenet news groups such as comp.object where people picking up object-oriented programming can post questions or simply commiserate about problems they are having in the transition.

Also, and perhaps most importantly for Boneham, she sat at the elbow of a colleague skilled in object-oriented design every chance she got.

"I found the level of frustration got so high so fast because the way I had always approached problem-solving no longer worked," Boneham says. "If we didn't have someone around who knew this a lot better than I did and was willing to talk, I wouldn't have made it even this far."

transition COSTS

TRAINING

(INCLUDES ACTUAL TRAINING COSTS AND LOST PRODUCTIVITY COSTS)

- Cost to train a central IS person to learn a new infrastructure: **$35,000 to $50,000**
- Cost to train a developer to work on new platforms in the line of business: **$25,000 to $40,000**

TIME

- Weeks of class time for each central IS person: Approximately **10**
- Weeks of class time for each developer in the line of business: **5**
- Months of reduced productivity for each central IS person: **4+**
- Months of reduced productivity for each developer in the line of business: **2**

SOURCE: FORRESTER RESEARCH, INC., CAMBRIDGE, MASS.

THE *manager's* VIEW

Denise Matthys

SYSTEMS DEVELOPMENT MANAGER
KASH N' KARRY

Dawn Boneham's boss says she believes the change in mind-set from mainframe to object-oriented programming is, well, elementary.

On the wall of her office, Denise Matthys, systems development manager, has a poster from her daughter's first-grade class that is supposed to teach about classification, an important aspect of object-oriented programming. At the top of the poster are boxes with different classifications such as "pet." Along the bottom are pictures of various objects, including dogs and cats. A point of the game is to put the object from the bottom into the correct classification based on the object's particular attributes and functions.

"Classification is something we learned long ago and do so naturally, yet programmers often forget about objects and classifications and think only in terms of data-in and data-out," Matthys says. "It is a radical change to get people to stop thinking in terms of procedures."

IN *transition:*

JARES GALLAGHER

AGE: 29
PROGRAMMER/ANALYST
ARIZONA DEPARTMENT OF TRANSPORTATION
PHOENIX

If Jares Gallagher could do it all over again, she would probably approach the transition from a mainframe environment to client/server in an entirely different way.

"This process may have been less frustrating if I had learned about the complexities of client/server before I started playing with some of the GUI tools and got all excited," Gallagher says. Learning to code prototype graphical user interface (GUI) screens in Microsoft Corp.'s PowerBuilder was easy enough to pick up from manuals; learning where GUIs and PC applications fit into a newly downsized client/server environment proved to be a lot tougher.

"We were playing with an evaluation copy of PowerBuilder and I thought, 'OK, cool, I'm going to be building applications next week,'" Gallagher says. "Then, after we took a client/server class, I knew it was going to be a long while before I built any applications."

Gallagher has more than 10 years' experience in Cobol and JCL programming on mainframes and was brought into the client/server project because she had experience using KnowledgeWare, a mainframe computer-aided software engineering tool from Texas Instruments, Inc. Using the tool, Gallagher took a business-area analysis of the Department of Transportation's field offices and built a process model, a data model and the data flow diagrams for the client/server system.

After finishing the design work, Gallagher expressed interest in getting involved in the actual coding of the new system. That curiosity and the desire of the company to develop in-house client/server expertise landed her smack in the middle of a mainframe-to-client/server changeover.

The infrastructure, which is in process, will eventually include 32 Novell, Inc. LAN Manager LANs, 450 client PCs and Microsoft Windows NT servers on a statewide T1 backbone.

A two-day client/server class at Midak University in Phoenix drove home the complexities involved in transitioning a computer system from mainframe to client/server.

"When you're working on a mainframe computer, you don't think about the operating system or platform, you just jump in and start writing Cobol," Gallagher says. "My boss and I kind of walked out of there and just stared at each other. We were pretty shocked."

Gallagher got a second shock after she took a four-day class on PowerBuilder at Midak.

Gallagher had thought client/server development in PowerBuilder would simply be a matter of drawing screens and creating icons. Uh-uh. It involved some concepts foreign to her, including the idea of inheritance, the need to solicit developer and user feedback in putting together a GUI style guide (which determines look and feel including button styles, colors, pop-up vs. pull-down menus) and the need to learn C to build applications.

"I found out there was a lot to that tool, too, and walked out of there feeling overwhelmed," she says.

Luckily for Gallagher, her department is learning right along with her and is committed to training in-house people instead of looking elsewhere for already developed talent.

Despite the daunting challenges of client/server, Gallagher is glad to get out of the data center and work more closely with users.

"When I was a Cobol programmer, I would just get the specs and not really see the user until I was almost done," Gallagher says. "With this I am going to get out and find out what the users really want."

THE *manager's* VIEW

Jill Harvey

ELECTRONIC DATA PROCESSING PROJECT TEAM LEADER
ARIZONA DEPARTMENT OF TRANSPORTATION

Jares Gallagher's manager says she believes people who will be successful in the transition from mainframe to client/server are those who can see past the immediate.

"To make a successful transition, you have to be extremely curious and extremely confident that what you eventually turn out will be good, even when it seems you're in way over your head," says Jill Harvey, electronic data processing project leader. Good upper management support in the form of patience and some relief from everyday duties also helps the process enormously, she says.

For example, for development staff members like Gallagher, learning new skills is a primary responsibility in the coming year, a fact reflected in their performance reviews and management expectations.

"We were going to do it on a consultant basis but agreed we should take a little longer so we would have the skill sets in-house," Harvey says.

UPCOMING

See next week's Management section for a look at the managerial issues that executives must tackle when information systems staffers move to object technology.

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Objects, everywhere

Object-oriented systems pose new challenges as well as opportunities for database administrators

By Don Burleson

OBJECT-ORIENTED SYSTEMS will change your life — especially if you're a database administrator.

As these systems come closer to the fore, database administrators will experience changes in their daily routines, and more important, see new opportunities unfold.

While some experts say true object systems are not meant for the mainstream, market numbers are growing. Those responsible for safeguarding and distributing information might need to add object management to the mix. In this capacity, an understanding of the object layer and the internal database structure will be required.

Unlike traditional systems, which consist of a database and a collection of programs, object-oriented systems are built *around* a database and an object layer — that is, they couple the data and the programs that manipulate it. Like traditional systems, they encapsulate data and data relationships, but they go one step further and encapsulate the behaviors of the objects.

It is the object administrator's job to manage these objects. Generally, this involves three major functions: maintenance of object methods (code snippets that govern an object's behavior and performance), documentation of interfaces to objects and management of distributed object systems.

The domino effect

Object management is the object administrator's greatest challenge. It involves tracking the object class hierarchy and providing impact analysis for any data or behavior changes. Administrators must know the location, name, function, inheritance and polymorphism of every behavior stored within objects.

The difficulty arises when a method is altered. Just as changes to a data item may affect many programs, changes to a method may affect lower-level classes. When a change is made to a high-level class (called a base class), an administrator must check all lower-level methods to make sure they properly inherit the changed method.

Administrators must also regularly document the methods encapsulated in each object and the messages (triggers that fire off the methods in an application) sent to each object. This road map, which is similar to the entity relationship model used for traditional systems, lets programmers see how objects interact.

Add distributed object databases, which manage communications among many databases, and you have a lot of extra responsibilities. The administrator must manage the Object Request Broker, the central software component of the Common Object Request Broker Architecture (CORBA). The CORBA standard has been adopted by most large vendors and guarantees that all objects, regardless of home database, communicate in a standard way.

To be successful, object administrators must understand the internals of a database engine, even if an object-oriented database is not used. In many cases developers build object layers, usually in C++ or Smalltalk, and interface them to a traditional relational database. Proficiency in the programming language used by the object layer is also required.

The success of an object-oriented system also depends on thorough planning and careful object analysis. Poorly designed object systems are much less flexible than their relational counterparts because of the rigorous class hierarchy and data relationship definitions. Unlike relational implementations, there is no such thing as ad hoc query against object databases unless the access path has been predefined to the system.

Eventually, as pure object-oriented databases become robust enough to support mission-critical applications, companies will migrate from object layers on top of relationals to a pure object-oriented approach. When that happens, the object administrator will assume full responsibility for the entire object architecture, and the database administrator's role as we know it will become obsolete. ■

Burleson is a database administrator and author of *Practical Application of Object-oriented Techniques for Relational Databases*. He also teaches information systems at a local university.

Getting from here to there

Object administration is very different from traditional database duties

Database administrators

- Document database structure.
- Analyze impact of data changes.
- Maintain database definitions.
- Monitor database performance and tuning.
- Regulate system access and other security issues.
- Provide database recovery and perform schema changes.

Object administrators

- Document the design of the object layer.
- Analyze the impact of method changes.
- Maintain object class libraries.
- Ensure that object classes properly interact with the database.
- Migrate object layer changes from testing to production systems.

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Reach out and touch someone

Smart IS professionals are finding people who have the skills they need and are willing to share

By Julie Hart

KEEPING up

Struggling to implement a new technology? Learning a challenging new skill? If so, don't go it alone. Surround yourself with experts — for free.

"With training budgets so tight right now, we've had to find new ways to solve problems," says Joanna Morgan, director of corporate information systems at Cooper Industries in Houston.

Rather than halt technology advancement until budgets bounce back, many IS managers are networking with other companies to exchange information.

"Someone has already solved 80% of the [information technology] problems out there," says Christine Stormont, director of systems development at a Boston financial firm. "People want to solve problems on their own, but I don't have the patience or the time."

Recently, Morgan, whose training budget has shrunk more than 30% in the past two years, met a colleague at a professional breakfast. Although they are in different industries, the IS directors discovered their corporate LANs are similar. They each run Novell, Inc. NetWare over Token Ring and have a corporate population of about 400.

"I think we can benefit by getting together to exchange ideas," Morgan says. Interested in what the other company has done in terms of automated software distribution, Morgan is arranging an informal lunch so the two staffs can identify topics of mutual interest.

Let the vendor do the walking

Jim Murdock, a research consultant at Kemper National Insurance in Chicago, used his vendor to find other professionals working with Lotus Development Corp.'s Notes under OS/2.

"I was having trouble getting the product to communicate over my LAN," Murdock says. "When you reach a problem, the availability of classes are limited, but Lotus gave me names of companies in my area."

As it turns out, one of the contacts saved him nearly two days' work. "He offered to take a look at my CONFIG.SYS files and [initialization] files," Murdock says. "We exchanged files via fax and spent some time on the phone." Before long, Murdock's problem was solved and his 600 users could use Notes over the network.

Murdock says this "available" attitude is most prevalent in companies using leading-edge technology. "Companies on the fringe are very willing to help because they've had to fight the same battles," he says.

"It amazes me that people don't just pick up the phone and ask for help," says Stormont, who often calls people who have been quoted in articles that are of interest to her. "People have been really great to me."

A more time-consuming but equally beneficial networking approach is building your own special interest group.

"With a group, you can keep up to date on technology and share experiences with a lot of different people," says David Rahn, manager of American National Can Co.'s information center in Chicago.

Last year, the company installed WordPerfect Corp.'s Office 3.1 for nearly 1,000 users. "It was important to get it up and running quickly," Rahn says. "Our second goal was to get the fax gateway running."

Once those steps were accomplished, the company wanted to know how to use a Message Handling Service gateway to access outside mail systems, so Rahn decided to start a local WordPerfect Office special interest group. He advertised through the WordPerfect user group newsletter, obtained names from his vendor representative and invited anyone interested to a kickoff meeting at his office.

So far, Rahn's company has hosted three on-site meetings. "I've already gathered useful advice from other companies regarding gateway communication," he says.

IS managers recommend keeping this type of venture simple. "Move slowly and don't overcommit," says Stormont, whose company is actively promoting a regional user group for a human resources package. "We made a decision to take it one month at a time. If it doesn't work out, it will die on its own." ■

Hart is a free-lance writer in San Jose, Calif.

Networking in the '90s

A great way to build up your Rolodex and increase experience is to join a workgroup sponsored by the Society for Information Management (SIM).

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Software Engineer to redesign on VAX/VMS and on IBM/Zenith PC distributed database environment new vehicle control strategy software for Power Train Engine Control (PTEC) calibration system to allow Electronics Engine Controls staff to concentrate on engine calibration in engineering units rather than in binary or hexadecimal units. Learn through the support of the VECTOR (Vehicle Control) system (approx 90,000 lines of code) written in PL/1 and executing on a VAX 7000 Cluster and then develop a new system to run on VAX/VMS and in a PC environment. Design user interface design for windows and character based devices. Test and implement systems on different platforms from local and remote locations. Require Bachelor's in Computer Eng. Bachelor's coursework must include Computer Operating System, Data Base Theory, Microprocessor & Microcomputer and Compiling Techniques. Bachelor's project must involve converting PL/I program to C program. Must be trained on HP-9000, VAX Machine, P41. 40 hr wk. 9am-5pm. $32,264.85/yr. Send resume to 7310 Woodward Ave., Room 415, Detroit, Michigan 48202. Ref. No. 116293. Employer Paid Ad.

SOFTWARE ENGINEER: 40 hrs./wk. 8am-5pm, $39,000/yr. Design and develop application software systems on IBM mainframes utilizing MVS, VM, COBOL, CICS, DB2 and ASSEMBLER. Perform requirement analysis, logical design and preparation of E-R diagrams. Assist in systems documentation and implementation. Require Bachelor's degree in Computer Science or Computer Engineering, 3 yrs. expr. in job offered or 3 yrs. expr. as Programmer/Analyst/Assistant Systems Analyst. Experience in developing software sys-tems utilizing MVS, VM, COBOL, CICS, DB2 and ASSEMBLER. "Employer Paid Ad". E.O.E. Send resumes to: 7310 Woodward Ave., Rm. 415, Detroit, MI 48202. Ref. No: 8794.

SOFTWARE ENGINEER: 40 hrs./wk. 8am-5pm, $42,000/yr. Design & develop computer s/w application systems in UNIX & NOVELL Lan environments utilizing C, C++, UNIX & ORACLE. Prepare program specifications, test & implementation plans and test data. Write user manuals. Reqr. Bachelor's Degree in Comptr Scnc, Electrical or Electronics Engnrng, 3 yrs. expr. in job offered or 3 yrs. expr. as Programmer/Analyst. Project Leader. Exper. in design & development of computer s/w application systems in UNIX environments utilizing C, C++, UNIX & ORACLE. "Employer paid ad". E.O.E. Send resumes to: 7310 Woodward Ave., Rm. 415, Detroit, MI 48202. Ref. No: 3194.

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The successful candidate will provide software support and services to the engineering and manufacturing organizations. Requirements include a BS in Computer Science or Engineering or equivalent experience, 3-5 years' professional experience programming real-time applications in FORTRAN, C, or Pascal, with at least three years in the VAX VMS environment. This position also requires a minimum of 2 years' experience with Oracle database and forms. Position is in a teamwork environment, with responsibilities including all stages of the software life cycle. Team leadership skills and a background in a manufacturing environment are preferred. ***Requisition # 40102.***

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Candidates must have a min of 3 yrs in a large scale computer environment performing PC installs/upgrades, problem analysis of PC systems including network support of Intel PCs, Windows/DOS software, Novell Netware, and token-ring/Ethernet connectivity to an IBM mainframe. (A Master's Degree in Computer Science or a Bachelor's Degree in Electrical Engineering may be substituted for one year of general experience.)

We are seeking candidates with experience in SNA/SDLC implementation and support, token ring, decnet, Ethernet, DEC devices, Netware LAN administration, Netware LAN management, Pathworks support, equipment installation and support for 3270 devices, Personal Computers, and PC peripherals/components. Diagnostic, troubleshooting, configuration, and supervision experience in necessary. Work includes planning, organizing and coordinating personnel who perform the day-to-day operation of equipment acquisition and installation, problem resolution, and operation of LANS and terminal/workstation equipment. Salary is $43,656 - $53,076 annually with excellent benefits. Applications will be accepted from 8AM, March 14, until 5:00pm on March 28, 1994. Contact the County Employment Office 710 "J" St., Sacramento, CA 94814 (916) 440-5593 for information and forms. A/A EOE.

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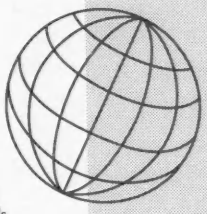

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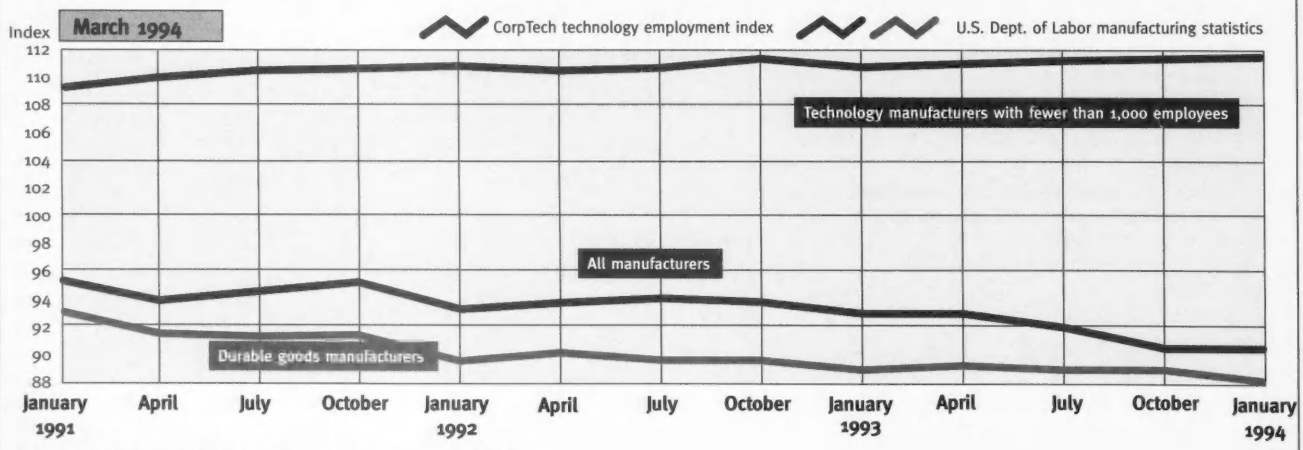

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Work Location: Las Vegas, NV

These positions require a minimum of five years experience or more in the data processing field including experience as a System Manager of a VAX cluster. Experience with DECnet, networking, TCP/IP, and distributed applications is desirable. Experience with company wide document imaging is a plus, particularly Excalibur EFS. Must have experience with system management, performance tuning, software installation and system level experience with Rdb and Oracle. Experience in the VAX/VMS environment with Pathworks and Novell LANs on an extended ethernet network is required. Additional experience in designing, developing, and configuring Pathworks and Novell LANs is a must.

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Work Location: Mercury, Nevada

These positions require a bachelor's degree in Management Information Systems, Computer Science, related fields or equivalent experience. Must have at least two years of application development experience with Digital Equipment Corporation (DEC) VAX/VMS and MS-DOS. FORTRAN, C, FoxPro or dBASE, SQL, INGRES or equivalent application development environment experience is required.

Should have good communication skills, a solid foundation in structured systems analysis/design (Yourdon preferred), relational database concepts, and structured programming techniques. Knowledge of SmartStar, Oracle, FLOW-GEMINI, EXCEL or Quattro Pro, and WordPerfect is desirable.

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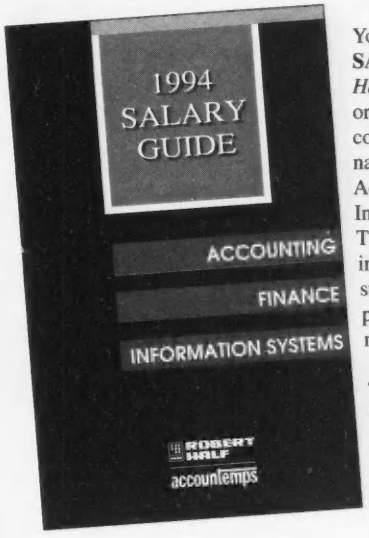

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Marketplace

GREAT PROGRAMMING FINDS

BY ALICE BREDIN

Pet products for programmers? It sounds silly. But when asked about the tools they would not want to work without, the programmers we contacted had a few ideas. They named products that saved time, simplified tasks and gave them greater control over development projects. We picked a few from the lot, and here's what they said.

Bredin is a free-lance writer in New York.

BRIEF AND DBRIEF

Editing package
Borland International, Inc.
Scotts Valley, Calif.
(800) 331-0877

Daniel LeClair, a programmer at Shel-Ray Underwriters in Houston, says Brief helps him write code by automatically inserting commands. When setting up a data entry screen, it reads a targeted database in dBase and imports the structure. "Otherwise I would have to go into dBase and do it manually. Something that takes five seconds with Brief and DBrief, used to take about three minutes," he says.

PK ZIP, PK UNZIP

Data compression utility
Pkware, Inc., Brown Deer, Wis.
(414) 354-8699

Scott Maisey, a programmer at ARA Services, a Philadelphia-based food service company, uses PK Zip to compress files that must be copied to a floppy for transfer to another system. PK Unzip decompresses them. Maisey says these products help save time and avoid confusion. "Without this, you have to use a few disks and keep track of which files you copied onto which disk," Maisey says.

ALPHA FOUR

Relational database management and application development system
Alpha Software Corp., Burlington, Mass.
(800) 852-5750

Totila Grandbergs, a programmer for Galveston County in Texas, uses Alpha Four to set up fields, edit data entries and build data forms when using Borland's dBase III. Grandbergs says he likes Alpha Four because it is fast. "If you don't have to do complex data manipulation, it's easy to put together an application in an hour or two, including menus and screen forms," he says.

VP/IX

DOS and Unix integrator
SunSoft, Inc., Mountain View, Calif.
(800) 227-9227

Roy Tollison, a programmer for the city of Pampa, Texas, uses VP/IX to do Cobol development, documentation, editing and coding at the DOS level. It compiles the program, provides a runtime and allows the user to move the file to Unix. "I tell [the software] where to stick the file, and it invokes the editor. When I say 'compile,' it finishes up and moves it over to Unix," Tollison says.

PATHFINDER

Documentation and cross-reference software
Hawkeye Information Systems
Fort Collins, Colo. (303) 498-9000

Mark Kordys, a programmer at Schilli Transportation Services in Remington, Ill., uses Pathfinder for the AS/400 to scan his system for information by source field. It rids him of the task of remembering every instance of a particular source field and saves time. "If you're looking in accounts payable for a date and you have 100 programs, it can save you about five or six hours," he says.

MKS TOOL KIT

Programming utilities
Mortice Kern Systems, Inc.
Waterloo, Ontario (519) 884-2251

Mark Zudeck, a contract software engineer, says his favorite utility is the Generalized Regular Expression Parser (GREP) in the MKS Tool Kit. GREP searches file directories for a string, finding every incidence of a sentence. Without it, Zudeck must load each file into his word processor. String searches can also be done by naming the types of characters rather than literal strings.

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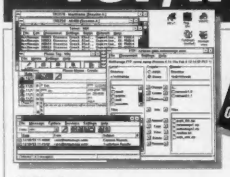

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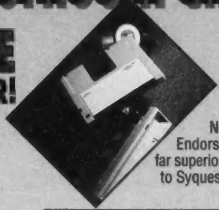

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Bids & Proposals

Civil Aviation Authority
AUSTRALIA

REQUEST FOR PROPOSALS

The Australian Civil Aviation Authority (CAA) is currently designing a new system for selection and training of Air Traffic Control trainees. One of the developments as a consequence of this exercise is a move from mainframe simulation to workstation/P.C. based simulation.

The CAA invites suitably qualified companies to examine a detailed functional specification that has been prepared by the CAA (and is provided with the Request for Proposal document) and put forward proposals to supply and install stand alone P.C. based simulators at various locations around Australia.

Responses to this Request for Proposal C94/11 are required by 2.00pm. EST on Thursday 14 April 1994 and must be lodged at:

CAA Tender Box
Ground Floor, Secondary Foyer
Records Management Window
Civil Aviation Authority
Alan Woods Building
25 Constitution Avenue
CANBERRA ACT AUST 2600

Responses shall not be accepted at any other location.

The Request for Proposal document or additional information is available on request from Mr Brian Keech on telephone 61-6-2684209 or fax 61-6-2685695.

Bids & Proposals

THE PORT AUTHORITY OF NY & NJ

REQUEST FOR PROPOSALS
DESIGN OF A WIDE AREA NETWORK

The Aviation Department of The Port Authority of New York & New Jersey is seeking Consultants to provide expert professional and technical services to design a Wide Area Network (WAN). This WAN will integrate up to 30 existing and planned Local Area Networks located at Aviation Facilities including, Kennedy, LaGuardia and Newark Airports as well as the World Trade Center and area heliports.

The selected Consultant will survey existing conditions and provide WAN design, optimizing the use of existing computer, microwave, and network communications equipment and software.

The WAN will be capable of high-speed transfer of video, text, CADD/business graphics, and spreadsheet files. In addition, the WAN will support document management and control functions including among other functions, search, retrieval, and transfer capability of scanned documents, including both correspondence and design drawings. Finally, it will support on-line access across the WAN, and will communicate with other existing platforms.

Interested vendors will be required to provide information on specific area(s) of their firm's expertise, references for past projects performed, technical qualifications and experience of key personnel, certified financial statements, fees and time estimates for services, and information quantifying the firm's past, as well as planned, use of Minority and Women Business Enterprises.

Consultants will be selected based upon the information provided. A breakdown of evaluation criteria and their order of importance is included in the Request for Proposals. Interested Consultants should submit a written request for a copy of the Request for Proposals by 5 P.M., March 30, 1994 to:
The Port Authority of New York & New Jersey, ATTN: Nancy J. Johnson, Aviation Department, Aviation Planning Division, One World Trade Center - 65 East, Dept. 27, New York, NY 10048. Telefax: (212) 435-3897. Requests for Proposals will be sent out on or about March 31, 1994.

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Call Dick Kampa at Motorola (708) 576-2476

Bid / Proposals

MS CENTRAL DATA PROCESSING AUTHORITY

Sealed proposals will be received by CDPA, 301 N. Lamar St., 301 Bldg, Suite 508, Jackson, MS 39201 for the following:
RFP No. 2571, due Fri, 4/22/94, at 3:30 p.m. for the acquisition of hardware software, and technical support necessary for the implementation of nine statewide local area networks for the Mississippi Department of Rehabilitation Services. Charge $10.00.
RFP No. 2572, due Wed, 4/20/94, at 3:30 p.m. for the turnkey implementation of a fully operational claims processing and court administration system, including all hardware, software, and services, for the Mississippi Workers' Compensation Commission. A mandatory bidders' conference is scheduled for Tues, 3/29/94, at 10:00 a.m. at CDPA, Suite 508, 301 N. Lamar Street. No Charge. Deadline specifications for each RFP with a charge may be obtained by submitting a written request accompanied by the appropriate payment. For phone requests will be accepted. NOTE: Valid forms of payment are corporate checks on a Mississippi bank, certified check or POSTAL money order made out to Central Data Processing Authority. No cash or out-of-state checks. For RFPs with no charge call Linda Watkins @ 601-359-2604. The CDPA reserves the right to reject any and all bids and to waive informalities.

Bid / Proposals

THE UNIVERSITY OF MISSISSIPPI MEDICAL CENTER, 2500 North State Street, Jackson, Mississippi 39216
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Advanced Micro Devices	24.0	Micrografx Inc.	-27.6
Parallan Computer	23.8	Digital Systems Int'l Inc.	-21.1
Progress Software Corp.	22.4	Gupta	-13.4
Adobe Systems Inc.	16.8	Cirrus Logic	-12.5
Micropolis Corp.	16.0	Commodore Int'l	-11.1
Legent Corp.	14.8	Creative Technologies Inc.	-9.5

Dollar

Progress Software Corp.	9.50	Intelligent Info. Systems (L)	-9.25
Matsushita Electronics	8.50	CrossComm	-7.00
Advanced Micro Devices	5.50	Cirrus Logic	-5.13
Adobe Systems Inc.	4.75	Gupta	-4.00
Micron Technology (H)	4.63	Creative Technologies Inc.	-3.50
Newbridge Networks Corp.	4.25	SynOpsys	-3.25
Legent Corp.	4.25	Micrografx Inc.	-2.63
Lotus Development (H)	3.75	ITT Corp. (L)	-2.38

1993 IPOs faring well

If you bought into **Cambridge Technology Partners'** (CATP) initial public offering (IPO) last year, give yourself a pat on the back. If you bought **Equinox Systems, Inc.'s** (EQNX) IPO, make it a swift kick in the keister.

To date, Cambridge Technology Partners tops last year's 54 information technology IPOs in performance (as of last Wednesday's close). Equinox brings up the rear, having lost nearly two-thirds of its initial share value.

Cambridge Technology Partners is in the process of making a secondary offering.

Of the 54 new stocks, 42 are currently trading at or above their IPO share price, while 12 stocks are down. The average rise for the entire group is 41%; 24 companies on the list outperformed that average.

Only IPOs valued at $10 million or more are included.

—Derek Slater

Progress report

The best and worst performers among 1993 hi-tech IPOs as of Wednesday's close include the following:

The best	1993 IPO date	Wed. price	Change from IPO
Cambridge Technology Partners	4/8	16.50	230%
Powersoft Corp.	2/3	57.75	189%
Wall Data, Inc.	3/15	55.50	178%
NetManage, Inc.	9/20	44.25	177%
Intuit, Inc.	3/11	45.75	129%
Novand Corp.	2/1	34.25	121%
Cornerstone Imaging	9/9	24.00	118%
ENCAD	12/16	10.75	115%
QuickResponse Systems, Inc.	8/5	25.00	108%
Cyrix Corp.	7/16	30.50	91%
Brock Control Systems, Inc.	3/31	20.75	89%
Madge Networks, Inc.	8/4	18.75	88%

The worst	1993 IPO date	Wed. price	Change from IPO
Equinox Systems, Inc.	4/15	4.38	(62)%
Absolute Entertainment	4/29	3.88	(61)%
MathSoft, Inc.	2/3	6.25	(52)%
The Santa Cruz Operation	5/26	6.38	(49)%
Boca Research, Inc.	2/25	6.00	(40)%
Auspex Systems, Inc.	5/11	7.63	(36)%
Wind River Systems, Inc.	4/15	6.13	(35)%
Edumetics	4/13	5.13	(32)%

Exch	52-Week Range			Mar. 11 3 PM	Wk Net Change	Wk Pct Change
Communications and Network Services						**Off 1.26%**
OTC	63.25	19.63	3 COM Corp.	56.63	-1.00	-1.7
NYS	45.56	35.50	AMERITECH Corp.	41.00	-0.50	-1.2
NYS	65.00	50.88	AT&T (L)	51.13	0.25	0.5
OTC	26.50	12.50	Banyan Systems Inc.	14.00	-0.38	-2.6
NYS	69.13	50.75	Bell Atlantic Corp.	52.63	-0.50	-0.9
NYS	63.88	50.63	Bellsouth Corp.	54.63	-0.63	-1.1
NYS	17.13	4.25	Bolt, Beranek & Newman (H)	16.50	0.38	2.3
OTC	15.75	9.50	Brooktrout Technology	14.75	0.00	0.0
NYS	132.50	79.50	Cabletron Systems (H)	130.25	0.25	0.2
OTC	43.00	14.50	Centigram Communications	41.00	-0.25	-0.6
OTC	57.25	27.50	Chipcom Corp.	57.25	2.75	5.0
OTC	81.00	38.75	Cisco Systems Inc. (H)	79.50	1.00	1.3
OTC	18.38	8.00	Compression Labs Inc.	13.00	-0.25	-1.9
OTC	36.00	14.50	CrossComm	14.50	-7.00	-32.6
OTC	4.63	1.50	Data Switch Corp.	2.25	-0.13	-5.3
OTC	7.50	2.56	Digital Systems Int'l Inc.	2.56	-0.69	-21.1
OTC	73.13	24.25	DSC Communications	54.63	1.63	3.1
OTC	8.63	3.00	Fibronix Int'l Inc.	3.50	-0.13	-3.4
OTC	3.75	0.81	Gandalf Technologies Inc.	1.06	0.06	6.3
OTC	1.88	0.69	Gateway Communications	0.94	-0.03	-3.2
NYS	17.25	8.00	General Datacomm Inds.	16.00	0.13	0.8
ASE	3.13	2.00	Go Video	2.31	-0.06	-2.6
NYS	39.88	31.50	GTE Corp.	31.88	-0.13	-0.4
NYS	95.97	70.41	ITT Corp. (L)	85.88	-2.38	-2.7
OTC	29.88	21.19	MCI Communications Corp.	24.88	-0.63	-2.5
OTC	6.38	1.50	Microcom Inc.	5.38	0.50	10.3
OTC	9.00	3.50	Netrix Corp.	6.25	-0.25	-3.8
OTC	15.75	6.00	Network Computing Devices	6.88	-0.13	-1.8
NYS	11.13	5.38	Network Equipment Tech.	8.25	-0.13	-1.5
OTC	23.38	8.00	Network General (H)	21.38	-1.63	-7.1
OTC	11.50	6.88	Network Systems Corp.	8.00	-0.50	-5.9
OTC	73.88	26.94	Newbridge Networks Corp.	60.50	4.25	7.6
NYS	44.00	21.38	Northern Telecom Ltd.	30.25	-0.38	-1.2
OTC	35.00	17.00	Novell Inc.	23.38	-1.38	-5.6
NYS	48.88	36.25	Nynex Corp.	36.25	-1.00	-2.7
OTC	30.00	19.00	Octel Communications Corp.	26.75	-0.75	-2.7
OTC	18.25	8.75	Optical Data Systems Inc.	13.25	0.25	1.9
OTC	7.13	3.75	Penril Data Comm Networks	7.00	0.50	7.7
OTC	27.25	13.50	Picturetel Corp.	14.50	0.00	0.0
OTC	8.25	3.63	Proteon Inc.	7.00	0.50	7.7
NYS	38.88	21.13	Scientific Atlanta Inc.	31.38	0.00	0.0
NYS	47.00	35.75	Southwestern Bell Corp.	40.75	1.63	4.2
NYS	40.25	29.50	Sprint Corp.	36.13	0.38	1.0
OTC	26.75	12.50	Standard Microsystems Corp.	17.75	-1.25	-6.6
OTC	19.75	10.25	Stratacom Inc.	16.50	0.75	4.8
OTC	42.75	20.00	Synoptics Communications	24.75	-0.25	-1.0
OTC	13.25	2.88	Telebit Corp. (H)	12.25	-0.50	-3.9
OTC	46.00	18.25	US Robotics (H)	44.00	1.00	2.3
NYS	50.75	39.00	US West Inc.	39.75	-0.63	-1.5
OTC	82.25	36.75	Wellfleet Communications (H)	82.25	3.00	3.8
OTC	28.25	7.25	Xircom (H)	24.75	-1.63	-6.2
OTC	30.00	15.25	Xyplex Inc.	19.00	-0.13	-0.7
PCs and Workstations						**UP 0.99%**
OTC	5.56	2.50	Advanced Logic Research	5.38	1.13	26.5
OTC	59.13	22.00	Apple Computer Inc.	37.38	0.63	1.7
OTC	13.00	12.75	AST Research Inc.	23.13	-0.88	-3.6
NYS	5.63	2.50	Commodore Int'l	3.00	-0.38	-11.1
NYS	101.88	43.13	Compaq Computer Corp.	101.88	2.75	2.8
OTC	39.13	13.50	Dell Computer Corp.	25.38	-2.13	-7.7
OTC	25.00	16.75	Gateway 2000 Inc.	22.38	-1.00	-4.3
NYS	93.63	64.38	Hewlett Packard Co.	90.63	0.75	0.8
NYS	26.00	11.75	Silicon Graphics	24.63	-0.63	-2.5
OTC	32.63	21.13	Sun Microsystems Inc.	29.25	0.00	0.0
NYS	50.75	25.75	Tandy Corp.	43.50	2.13	5.1
OTC	5.63	2.50	Zeos International Ltd.	3.13	0.13	4.2
Large Systems						**UP 4.85%**
ASE	8.13	4.38	Amdahl Corp.	6.50	0.75	13.0
NYS	7.25	3.63	Convex Computer	6.75	0.25	3.8
OTC	4.50	1.88	Cray Computer	2.50	0.25	11.1
NYS	32.63	20.38	Cray Research Inc.	32.63	2.13	7.0
NYS	13.50	7.50	Data General Corp.	7.50	-0.75	-9.1
NYS	48.25	27.75	Digital Equipment Corp.	31.13	0.13	0.4
NYS	52.25	33.88	Harris Corp.	49.38	1.38	2.7
NYS	60.00	40.63	IBM	55.75	3.13	5.9
OTC	25.75	3.38	Kendall Square Research	5.63	0.50	9.8
NYS	171.50	95.00	Matsushita Electronics	171.00	8.50	5.2
OTC	18.75	12.75	NetFrame	16.38	1.38	9.2
OTC	26.00	9.25	Parallan Computer	13.00	2.50	23.8
OTC	23.25	11.25	Pyramid Technology	14.00	0.25	1.8
OTC	23.25	11.25	Sequent Computer Sys.	13.75	-0.38	-2.7
OTC	6.84	1.75	Sequoia Systems Inc. (H)	6.06	-0.44	-6.7
NYS	41.25	20.25	Stratus Computer Inc.	27.88	0.25	0.9
NYS	15.50	8.50	Tandem Computers Inc.	14.88	0.38	2.6
OTC	30.00	10.63	TriCord Systems	17.50	0.25	1.4
NYS	15.75	9.88	Unisys Corp.	15.75	1.88	13.5
Software						**UP 0.56%**
OTC	37.00	16.25	Adobe Systems Inc.	33.00	4.75	16.8
OTC	27.75	13.50	Aldus Corp.	25.00	1.88	8.1
OTC	7.88	5.13	American Software Inc.	5.88	0.13	2.1
OTC	26.25	7.63	Ask Computer Systems (L)	7.88	-0.25	-3.1
OTC	61.00	37.00	Autodesk Inc. (H)	60.88	1.38	2.3
OTC	4.50	2.38	Bachman Info. Systems	3.13	-0.25	-7.4
OTC	41.00	24.00	BGS Systems Inc.	25.00	1.00	4.2
OTC	71.00	38.75	BMC Software Inc. (H)	68.00	-1.38	-2.0
OTC	28.25	20.38	Boole & Babbage	23.50	-0.25	-1.1
OTC	27.25	12.00	Borland Int'l Inc.	12.50	-0.88	-6.5
OTC	4.63	2.75	CE Software	3.13	0.13	4.2
ASE	42.25	18.50	Cheyenne Software Inc.	40.88	0.38	0.9
OTC	14.25	6.00	Cognos Inc.	12.63	1.00	8.6
NYS	44.88	21.88	Computer Associates	36.38	-0.88	-2.3
NYS	6.13	2.13	Computervision Corp.	4.38	0.38	9.4
OTC	37.25	19.25	Compuware Corp.	35.50	0.50	1.4
OTC	12.25	5.75	Comshare Inc.	12.00	1.50	14.3
OTC	22.00	6.81	Corel Corp.	18.75	-1.50	-7.4
OTC	11.25	3.38	Easel Corp.	5.75	1.13	24.3
OTC	27.00	8.75	Filenet Corp. (H)	27.00	1.25	4.9
OTC	25.00	10.75	4th Dimension	10.88	-0.63	-5.4
OTC	11.13	5.25	Frame Technology	8.63	0.13	1.5
OTC	15.50	7.00	Group I Software	9.50	0.25	2.7
OTC	31.75	13.50	Gupta	25.88	-4.00	-13.4
OTC	12.00	6.13	Hogan Systems Inc.	9.88	0.00	0.0
OTC	22.38	11.13	IMRS	24.75	0.75	3.1
OTC	44.75	20.50	Information Resources (L)	21.25	-1.50	-6.6
OTC	27.25	13.38	Informix Corp.	22.63	-1.13	-4.7
OTC	12.75	8.50	Intergraph Corp.	9.75	0.00	0.0
OTC	10.38	4.88	Interleaf Inc.	7.88	0.63	8.6
OTC	13.25	4.75	Intersolv Inc.	12.25	-0.38	-3.0
OTC	18.75	7.75	Knowledgeware Inc.	13.25	0.50	3.9
OTC	44.50	15.50	Legent Corp.	33.00	4.25	14.8
OTC	77.00	23.50	Lotus Development (H)	77.00	3.75	5.1
OTC	18.50	4.25	MathSoft	6.00	0.00	0.0
OTC	10.75	4.50	McAfee Associates	8.00	-0.38	-4.5
OTC	15.50	7.88	Mentor Graphics	13.63	0.13	0.9
OTC	37.50	13.13	Micro Focus	14.13	0.00	0.0
OTC	11.63	4.38	Micrografx Inc.	6.88	-2.63	-27.6
OTC	98.00	70.38	Microsoft Corp.	81.75	0.50	0.6
OTC	37.75	15.88	Oracle Corp.	34.75	0.50	1.5
OTC	44.75	22.50	Parametric Technology	29.50	-2.25	-7.1
OTC	39.50	26.00	Peoplesoft	34.75	2.25	6.9
OTC	5.88	3.50	Phoenix Technologies	5.25	-0.50	-8.7
OTC	60.50	22.00	Powersoft	57.75	-0.38	-0.6
OTC	39.75	9.50	Platinum Software (L)	11.75	0.38	3.3
OTC	16.75	7.25	Platinum Technology	13.63	0.38	2.8
OTC	60.25	32.25	Progress Software Corp.	52.00	9.50	22.4
OTC	4.25	1.94	Quarterdeck Office Sys.	3.06	0.06	2.1
OTC	32.00	17.00	Rainbow Technologies Inc.	19.75	0.50	2.6
OTC	11.38	4.25	Rasterops	7.00	-0.50	-6.7
OTC	15.25	4.50	Ross Systems	5.50	-0.38	-6.4
OTC	28.75	12.25	Sapiens Intl. Corp. N.V.	12.38	-1.25	-9.2
OTC	9.00	3.13	Softkey Software Products	4.75	0.00	0.0
OTC	14.50	5.50	Software Publishing Corp.	6.75	0.13	1.9
OTC	17.25	6.75	Software Toolworks Inc.	9.13	-0.50	-5.2
OTC	2.88	1.19	Spinnaker Software	2.16	0.00	0.0
OTC	13.75	6.25	State of the Art	7.75	-0.13	-1.6
NYS	35.63	17.63	Sterling Software Inc.	32.75	-1.25	-3.7
OTC	21.63	12.00	Struct. Dynamics Research	15.13	-0.25	-1.6
OTC	48.13	25.38	Sybase Inc.	48.13	2.13	4.6
OTC	20.50	10.88	Symantec Corp.	15.50	0.63	4.2
OTC	52.75	25.75	SynOpsys	41.00	-3.25	-7.3
OTC	24.25	11.50	System Software Assoc.	16.63	0.63	3.9
OTC	6.75	2.88	Trinzic Corp.	4.75	0.19	4.1
OTC	30.00	13.50	ViewLogic Systems (H)	28.50	-1.50	-5.0
OTC	12.25	5.50	Walker Interactive Systems	10.25	-0.25	-2.4
OTC	2.56	0.84	Wordstar	1.38	0.00	0.0
Semiconductors						**UP 2.85%**
NYS	32.88	16.75	Advanced Micro Devices	28.38	5.50	24.0
NYS	30.50	17.13	Analog Devices Inc. (H)	29.38	1.38	4.9
OTC	49.63	16.75	Atmel Corp. (H)	47.13	-1.88	-3.8
OTC	7.50	2.75	Chips and Technologies	6.25	0.75	13.6
OTC	44.63	13.00	Cirrus Logic	35.75	-5.13	-12.5
NYS	19.25	9.38	Cypress Semiconductor Corp.	19.25	0.88	4.8
NYS	19.00	11.75	Dallas Semiconductor	18.25	0.00	0.0
OTC	74.50	42.75	Intel Corp.	69.00	-0.75	-1.1
NYS	21.63	10.50	LSI Logic Corp. (H)	21.25	-0.13	-0.6
NYS	26.75	12.25	Lattice Semiconductor	16.75	0.25	1.5
NYS	84.00	19.25	Micron Technology (H)	84.00	4.63	5.8
NYS	107.50	61.13	Motorola Inc.	106.25	1.63	1.6
NYS	24.38	12.00	National Semiconductor (H)	22.63	-1.25	-5.2
OTC	13.75	6.50	Sierra Semiconductor	8.88	-0.13	-1.4
NYS	86.38	51.63	Texas Instruments (H)	86.25	2.00	2.4
NYS	18.88	6.50	VLSI Technology	15.75	1.75	12.5
OTC	14.38	5.13	Weitek	8.63	0.50	6.2
ASE	19.13	3.63	Western Digital Corp. (H)	18.13	0.63	3.6
OTC	58.00	29.75	Xilinx (H)	54.25	-1.75	-3.1
OTC	40.75	21.50	Zilog Inc.	33.00	1.25	3.9
Peripherals and Subsystems						**Off 0.98%**
OTC	28.50	12.25	American Power Conversion (H)	26.50	-1.00	-3.6
OTC	24.75	15.50	Banctec Inc.	23.75	0.75	3.3
OTC	12.00	3.50	Cambex Corp.	4.13	0.00	0.0
ASE	9.75	3.88	Cognitronics Corp.	4.00	-0.06	-1.6
NYS	20.50	9.00	Conner Peripherals (H)	19.13	0.38	2.0
OTC	39.25	17.50	Creative Technologies Inc.	33.50	-3.50	-9.5
OTC	25.00	6.50	Data Race Inc.	8.88	0.00	0.0
ASE	11.63	5.38	Dataram Corp. (L)	5.50	-0.50	-8.3
NYS	22.00	5.69	EMC Corp.	20.63	1.63	8.6
OTC	12.25	5.25	Emulex Corp. (L)	12.25	0.00	0.0
OTC	21.00	14.25	Exabyte (H)	21.13	1.75	9.0
OTC	22.25	7.50	Intelligent Info. Systems (L)	7.88	-9.25	-54.0
OTC	34.00	7.88	Iomega Corp.	2.38	-0.13	-5.0
OTC	5.13	2.25	IPL Systems Inc.	7.00	1.13	1.8
OTC	9.75	5.75	Komag Inc. (H)	25.75	-1.00	-3.7
OTC	28.50	13.75	Maxtor Corp.	7.75	0.25	3.3
OTC	9.50	4.38	Micropolis Corp.	7.25	1.00	16.0
OTC	8.13	4.88	3M Corp	102.75	0.25	0.2
NYS	117.00	101.50	Printronix Inc.	8.00	-0.13	-1.5
NYS	9.50	6.25	QMS Inc.	9.00	0.50	5.9
NYS	17.25	7.50	Quantum Corp. (H)	18.88	0.25	1.3
OTC	20.25	9.38	Radius Inc.	7.63	-0.25	-3.2
OTC	9.13	3.13	Recognition International	13.00	0.50	4.0
NYS	17.75	11.75	Rexon Inc. (H)	6.63	0.13	1.9
OTC	6.88	3.63	Seagate Technology (H)	27.88	0.25	0.9
OTC	28.75	13.13	Storage Technology	39.50	0.13	0.3
NYS	45.00	21.75	Tektronix Inc.	26.88	0.13	0.5
NYS	28.25	21.38	Xerox Corp.	100.13	2.75	2.8
NYS	103.25	69.88				
Services						**UP 3.12%**
OTC	23.75	14.88	American Mgmt. Systems	19.88	-0.13	-0.6
NYS	4.25	2.38	Anacomp Inc.	3.88	0.13	3.3
OTC	23.50	14.50	Analysts Int'l	15.50	0.00	0.0
NYS	56.88	46.88	Auto Data Processing	53.63	-0.38	-0.7
NYS	23.38	13.00	Ceridian Corp.	22.50	1.00	4.7
NYS	24.25	13.88	Comdisco Inc.	21.88	0.88	4.2
OTC	16.13	6.84	Computer Horizons	15.00	0.63	4.3
NYS	41.00	23.34	Computer Sciences (H)	38.50	-1.75	-4.3
NYS	8.75	6.00	Computer Task Group	8.63	0.63	7.8
NYS	35.00	17.38	CompUSA Inc.	20.50	1.25	6.5
OTC	14.13	8.75	Control Data Systems Inc.	9.25	0.25	2.8
OTC	16.00	7.00	Corporate Software	15.38	0.00	0.0
OTC	11.00	6.63	Egghead Discount Software	9.50	0.63	7.0
NYS	34.25	26.00	General Motors E (EDS)	33.75	1.00	3.1
OTC	22.75	12.75	Inacom Corp.	19.25	0.00	0.0
OTC	28.00	12.00	Intelligent Electronics	26.25	0.63	2.4
OTC	21.75	9.75	Merisel	21.75	1.38	6.7
OTC	30.00	8.00	Microage Inc.	30.00	1.75	6.2
OTC	40.50	23.84	Paychex	37.63	-0.13	-0.3
NYS	87.25	21.63	Policy Management Sys.	36.38	-0.13	-0.3
NYS	48.25	32.00	Reynolds and Reynolds	47.75	0.25	0.5
OTC	28.50	13.63	SEI Corp.	24.75	-0.25	-1.0
OTC	28.50	17.50	Shared Medical Systems (H)	27.13	0.25	2.8
OTC	12.63	5.63	SHL Systemhouse	8.00	1.00	14.3
OTC	30.75	15.13	Software Spectrum Inc.	17.25	1.25	7.8
OTC	42.75	28.00	Sungard Data Systems	39.50	1.50	3.9

KEY: (H) = New annual high reached in period (L) = New annual low reached in period

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Wysiwyg

IF YOU COULD BE BORN IN ANOTHER CENTURY, WHICH ONE WOULD YOU CHOOSE?

Illustration by David Sheldon

"The 25th century.

I would like to see how far the human mind can expand unfettered by the human body. The idea of not being bound to earth, exploring new frontiers in outer space fascinates me."

—Isaac Kong, CEO, NetSoft

"I would choose the 22nd century.

I would hope to find that AIDS, cancer, war and the glass ceiling were things of the past. I would like to find out how the information superhighway evolved and did improve our lives, and perhaps by then I would find only two flavors of Unix."

—Anu Shukla, Vice President of Worldwide Marketing, Uniface Corp.

The 5th Wave *by* Rich Tennant

Inside Lines

Notes on NetWare at last

Almost two months behind schedule, Lotus will begin shipping on March 25 a Novell NLM version of Notes, said Jeffrey Papows, vice president of the Notes product division, in a private meeting last week. Introduced in December and originally promised for February delivery, the NLM version should make life a little easier for Notes shops by letting administrators run Notes on the NetWare file server rather than on a stand-alone OS/2 or Unix server.

Look, it's a server.... No, wait — it's a hub!

Chipcom said it will unveil today a combination network server and intelligent switching hub platform capable of integrating "almost limitless" combinations of networking services. Consisting of a six-slot Online System Concentrator and an IBM PS/2 server, the hybrid box will cost $6,995 and will be remotely manageable via SNMP. It will also include fault-tolerant features such as hot-swappable modules and automatic switchover backup power.

What, no SPARC chip in that ring?

Sun Microsystems CEO Scott McNealy, 39, finally met his match in 24-year-old Stanford University researcher Susan Ingemanson, his fiancee of one week. Rarely at a loss for words, McNealy swears he won't follow in Bill Gates' footsteps by renting an island for his September wedding. "If I did, it would have to be Alcatraz because this is a life sentence," he joked. Just to prove he's still a techno-geek at heart, McNealy gave his fiancee a diamond ring ("about the size of a Frisbee") in a box with a tiny light shining on the stone.

A license manager for everyone

Gradient Technologies is developing a version of its Ifor/LS software license manager that will be targeted at end users rather than software vendors. Gradient expects to start beta testing the end-user version in late summer and have it ready for commercial shipment by the fourth quarter.

The big ones

Xerox has narrowed the finalists in its outsourcing evaluation to EDS and a team of IBM's ISSC and AT&T, according to Computer Sciences. Computer Sciences, which had teamed with Andersen Consulting, has been eliminated. Yankee Group Chief Howard Anderson expects a final decision today. Meanwhile, Du Pont is entertaining proposals for what could be a comparably sized deal.

Brainshare partnering

Word has it that Novell will announce Natick, Mass., firm Noblenet as a partner for its AppWare development architecture at the Brainshare conference next week. Noblenet provides tools for developing applications that run across various vendors' Remote Procedure Call platforms, including ones from OSF, Sun and Texas Instruments. The move makes sense, given that Noblenet already provides an NLM product and that Novell lost Hyperdesk as its partner for providing CORBA-compliant AppWare modules.

Playing the field

IBM is by no means Legent's only partner in the client/server systems management business. The company is also busy working with HP to provide application management, including database monitoring and performance monitoring, under HP's Operations Center, a source tells us.

Don't expect IBM to take up the banner for SNMP 2 acceptance anytime soon. IBM honcho Sanjiv Ahuja said last week that the vendor wants to see strong signs of market interest before moving the SNMP-based NetView/6000 to the new version. Meanwhile, IBM continues to use CMIP in its OS/2-based LAN NetView platform and plans to announce at Cebit a CMIP-based version of NetView/6000. The latter will be aimed at carriers, however. If you have any ideas you're carrying around in the story department, pick up the phone and call News Editor Maryfran Johnson at (800) 343-6474 or fax them to her at (508) 875-8931. You can also send an E-mail over the Internet to mjohnson@cw.com. Our 24-hour tip line is (508) 820-8555.

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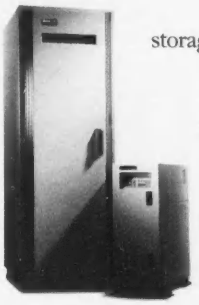

Symmetrix 4000 Series ICDA

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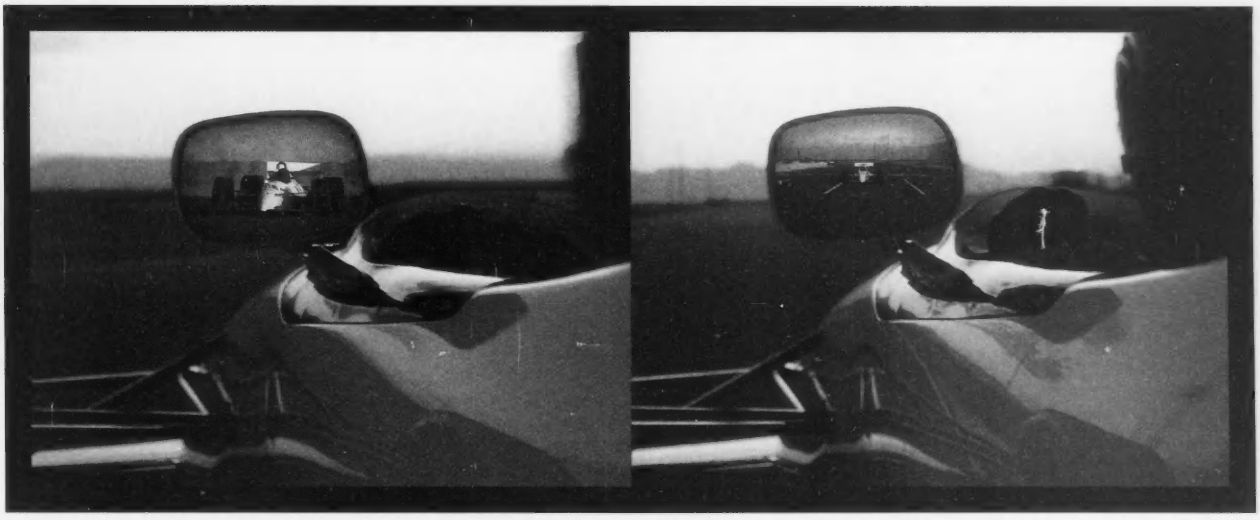

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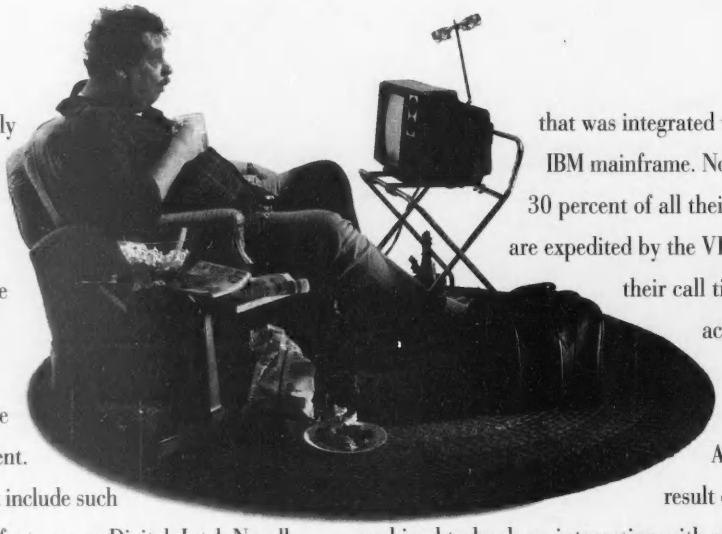

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